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San Francisco, Calif.

March 15, 1925
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# Journal of Electricity

Devoted to the Economic Production and Commerc of Electricity
IN THE ELEVEN WESTERN

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Journal of Electricity entered as second class matter February 17, 1921, at the post office at San Francisco, under the Act of Congress, March 3, 1879.
Published the 1st and 15th of each month, at 883 Mission Street, San Francisco, California.

MAR 23 1925 ©CIB653949


# Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

A McGraw-Hill Publication
Published Semi-Monthly
Established 1887



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VOLUME 54 SAN FRANCISCO, MARCH 15, 1925 NUMBER 6

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**McGRAW-HILL COMPANY OF CALIFORNIA — 883 Mission St. — SAN FRANCISCO**
Northwest Office: 1206 Spalding Building, Portland, Ore.
Publishers of JOURNAL OF ELECTRICITY

JAMES H. McGRAW, President — C. T. HUTCHINSON, Vice-Pres. & Gen. Mgr. — C. M. LINDSAY, Vice-Pres. & Treas.

WASHINGTON, Colorado Building
CHICAGO, Old Colony Building
PHILADELPHIA, Real Estate Trust Building
CLEVELAND, Leader-News Building
ST. LOUIS, Star Building
NEW YORK, Tenth Ave. at 36th St.

Subscription rates in United States, Canada, Mexico, Porto Rico, U. S. Possessions, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Nicaragua, Panama, Guatemala, Paraguay, Peru, Honduras, Salvador, Uruguay, and Spain, $2.00 per year, 2 years $3.00. Elsewhere $3.00 Gold (13 Shillings). Single copy, 25c. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.



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Entered as second-class matter Feb. 17, 1921, at the Post Office at San Francisco, California, under Act of March 3, 1879.

Member Audit Bureau of Circulation

Printed in U. S. A.



**McGRAW-HILL CO., Inc., New York**
Publishers of
American Machinist—European Edition (*Published in London*)
Industrial Engineer (*Published in Chicago*)
Electrical Merchandising
Chemical and Metallurgical Engineering
American Machinist — Ingeniería Internacional
Electrical World — Electric Railway Journal
Engineering and Mining Journal-Press
Bus Transportation — Engineering News-Record
Coal Age — Radio Retailing — Power


## *How Shall We Gage Our Usefulness?*

AN actor, a speaker or a musician can tell whether he is making an impression upon his audience by the amount of applause he receives. If his lines are funny or his speech stirs his auditors or his music is inspiring, he is immediately aware of the fact. With the editors of a paper like the Journal of Electricity it is entirely different. They are speaking to a scattered audience, never assembled in a group. The material appearing in the book seldom can be witty or inspirational. It deals largely with hard business facts or important news. Consequently there are few barometers by which the editors can gage the effect the magazine is having on its readers. Occasionally, however, letters are received in which a reader definitely gives his impression of the magazine. The following are typical of a number which have been received recently.

"I consider the Journal of Electricity the outstanding trade journal of the country for those whose interests parallel mine."
Manager, Power Sales Department.

"I consider the Journal a necessity for men in our business who wish to keep abreast of the development and in touch with the local situation."
Vice-pres. & Asst. Gen. Mgr.

"I have the Journal of Electricity purposely sent to my home in order that I may find time to read it, and it is the only electrical magazine that I consistently read."
President.

"The Journal is doing a useful work in its field and I believe it is much appreciated and is received with hearty enthusiasm by those engaged in the utility game."
Vice-President in Charge of Engineering.

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# EDITORIAL

### President Coolidge Reiterates Stand Against Government Ownership

THERE can be no doubt as to the attitude of the administration toward government ownership and operation of public utilities. The platform upon which President Coolidge was swept into office was clear enough on this point. Now comes the inaugural address on March 4 last, in which the president said, "There was a manifestation of such faith in the integrity of the courts that we can consider that issue rejected for some time to come. **Likewise, the policy of public ownership of railroads and certain electric utilities met with unmistakable defeat.** The people declared that they wanted * * * independence and freedom continued and supported by having the ownership and control of their property, not in the government but in their own hands."

It is not surprising, therefore, that industrial America is responding to the encouragement conveyed by such assurances by inaugurating developments and improvements that promise to establish new records. The idea of offering to promote the material welfare of the people by killing the initiative that creates opportunity for the people seems to have failed to register with the majority, for which may we be truly thankful. The sound underlying common sense of the majority of the American people may be relied upon with a certain confidence, if they are informed as to the facts of the issues involved. The real problem lies in informing the people.

---

### Appliances That Lie On the Shelf, Tra-La, Have Something to Do With the Case

JUST for the fun of it, someone ought to take the time to make a thorough survey of the homes within a supposedly electrified area, the sole objective of that survey to find out:

"How many electrical appliances are there on closet shelves or in the attic of so-called electrified homes—that is, homes wired for electricity? and

**"Why are they there?"**

As in all good O. Henry stories, the "kick" is in the last line. "Why are they there?" Indeed, yes.

Is it because the home has no convenience outlets, and that the appliance,—by the time a globe is screwed out of its socket, a double plug screwed in, amid encircling glassware—is really an electrical inconvenience? Then the remedy is to be sought in making electricity painlessly accessible, through modern wiring.

Is it because consumption of electricity is feared, lest the bill be too high? Then it is convenience and cleanliness that must be sold.

Is it because the appliance has been over-rated to the customer and, having been "stung," as he thinks, he does not want to use it? Then his misapprehension must be allayed and his confidence slowly built up to par.

It may be because the housewife is a creature of habit, old-fashioned, one who just will not adjust herself to the use of the labor-saving device, preferring to use the methods of her grandmother. Her case is almost, but not quite, hopeless. She is a hard and unyielding customer, but persistence in the demonstration of its usefulness may win her in the end.

Or is it that most subtle of reasons, the hardest to discover and the simplest to remedy? Something has gone wrong with the appliance. Maybe the insulation on the cord has worn out, something as simple as that. The cord shorted and blew a fuse. In fear, the housewife, feeling that she has somehow done something wrong, calls the power company, vaguely saying that the lights have gone out. Meanwhile she has stowed the offending appliance on the closet shelf or up in the attic lest the troubleman discover it when he arrives, and blame the trouble on that particular iron or percolator. Maybe she has had a previous experience with a gruff chap who made a remark something like this, "Were you using that thing? No wonder she blew."

Anyway the appliance has gone on the shelf, and it will probably stay there for several weeks, or months, before she will venture, furtively, to bring it out again and hook it up to the line. All that time the appliance is a dead loss to the central station.

The matter of servicing appliances is a delicate one. It is ground that a suggester treads upon lightly. But as long as the appliance lies on the shelf unused for want of intelligent and **courteous** servicing, it might as well never have been sold. It is a potential source of revenue that has been hidden away. Moreover, it is pretty apt to be an influence which makes that housewife timid about buying any new or different type current-consuming device—another potential source of revenue dammed up.

The appliance that lies on the shelf, tra-la, is an important point in the case. The sale of an appliance is not complete when it is merely put on the line. It must be kept on that line to be really sold.

### Another Congressional Excursion to the Colorado River

NEWS comes from Washington that another august body of United States senators and representatives shortly will visit Arizona for the express purpose of viewing the Colorado River and investigating the various phases of that stream with reference to the government's participation in its development. This time investigation of the all-American canal and the Boulder Canyon dam are excuses for a junketing trip.

What the people of the West desire with reference to the Colorado River are not excursions nor investigations. They want action; action by the states concerned with the Colorado River compact; action by Congress on some of the legislative phases of the problem.

Any number of investigations, surveys and studies of the river in all its phases have been made during the past decade. Many parties of Congressmen have visited the river and been impressed by its latent power. Sufficient data are available to furnish any Congressional committee with all the information it could possibly need in formulating plans or reaching a decision, without making a trip from Washington for a glimpse of the Grand Canyon. But then the present bill against the river for junketing trips, investigations and surveys is probably so large that a few thousand dollars for another Congressional excursion will not add much to the total.

---

### Life in a California Construction Camp

"TO see ourselves as others see us" is usually amusing, and to those in search of mental relaxation we commend at least one article of a series by T. B. Ross in our English contemporary, "The Electrical Review," which deals mainly with living conditions at the Big Creek construction camps of the Southern California Edison Company, as viewed through foreign eyes. Our guest from overseas describes the details with such minuteness that no difficulty is experienced in picturing the scene. British society distinctions were completely ignored. "There is no distinction of class when taking one's seat at table," Mr. Ross remarks with peeved indignation. He adds that "Americans are, I should say, the fastest eaters in the world. I and some of my own camp pals from home had often only just started a meal when the 'roughnecks' were leaving their seats after a hearty and full meal." Yes; not only fast eaters but fast workers, too; otherwise our critic would have gone elsewhere for data on "The World's Largest Engineering Project."

Mr. Ross might have realized that when in a foreign country he should make an attempt to learn whatever local peculiarities of language are current. It is distressing to be reminded, of course, that English-speaking people in various parts of the world (in various parts of England, too, it may be added) use different words to denote the same object. Mr. Ross asked his neighbor "to please pass the porridge," and was hurt at the inaction that followed his request. Luckily there was present someone of broader linguistic attainments, who added a translation: "Pass 'English' the mush."

Few visiting Englishmen, in criticizing Americans, are fair enough to temper judgment with a thought as to what would happen to a foreigner in England who insisted on disregarding local word usage. Imagine the reception that would be accorded an American in an English construction camp who insisted on referring to "porridge" as "mush." In this connection Mr. Ross comments on Big Creek table etiquette as follows: "From the fall of the flag until the finish, the average American workman never stops, and his methods of manipulation are in some cases somewhat rough and ready. . . . If you expect to eat anything you must forget your British table etiquette and manners. . . ." Note the fact that Mr. Ross compares the "upper" or "middle" classes in the old country with the workmen of America. This is illogical, unfair and a snobbish interpretation. We happen to have seen the table performances of Cornish laborers, Devonshire farmers, Welsh miners, cockneys and various other types of the genus workman in the British Isles; and it was evident that ample leisure had not resulted in the development of any fine sense of etiquette or delicacy of manipulation. The mistake made by Mr. Ross was in maintaining too close and reserved an association with his "camp pals from home." America is a fine country, but the judgment of foreigners will remain warped so long as an aloofness is maintained, based on an imported absurdity of social distinction and an illogical method of comparing the peoples of the two great English-speaking nations.

---

### Where Do We Go from Here?

NEWARK, Calif., is one of the large distributing points for power brought from the Sierra Nevada to the San Francisco industrial region. Three tower lines lead into the substation. Wires from two are connected to the switching structure. Cable reels from the third, the City of San Francisco's ninety-mile Hetch Hetchy line from Moccasin power house, lie on the ground a few hundred yards distant. A suggested title for the picture thus presented to a casual spectator might be "Where do we go from here?"

On April 1, 1925, or shortly thereafter, there will be available at this point 80,000 kw. of electrical energy, representing, in round numbers, approximately 360,000,000 kw-hr. annually at 65 per cent load factor. And in the meantime politicians in San Francisco are raising a hue and cry regarding the disposal of this block of power, befuddling the public mind with their wild proposals and getting nowhere.

The latest suggestion from the San Francisco supervisors is that the city advertise for bids for power in any size blocks at any point on its ninety-mile transmission line, provided the bidder is a municipality, a water district or an irrigation district. Nowhere north of Los Angeles is there a municipality large enough or with a municipally

owned distributing system which could handle such a block of power. The one irrigation district which might conceivably use a fair sized block of power already owns a generating station and is wholesaling a considerable surplus of its power to a private company. The folly of this latest suggestion is apparent.

Disposal of Hetch Hetchy power through the existing privately owned systems in San Francisco, under an agency agreement, purely temporary in character and restricted to the interim until, and if, the city acquires its own distributing facilities has been declared legal by the solicitor of the U. S. Department of the Interior. Such a procedure is heartily endorsed by the Chamber of Commerce and other civic bodies.

Until the Railroad Commission can complete its valuation of the systems of the privately owned companies already serving San Francisco, which will not be until March, 1926, and until the people of San Francisco vote on the question of whether or not they desire to embark upon so hazardous an undertaking as the distribution and sale of electric energy, the city would be wise to dispose of its power by the legal means suggested above. If it fails to do so, the taxpayers will lose a sum variously estimated at $2,000,000 annually. And as a closing thought for the consideration of the supervisors, we call attention to the defeat since 1918 of four proposals by the people to increase the debt limit of the city and of three proposals since 1910 to buy the system of the Spring Valley Water Company. We seriously doubt that the people ever will vote to follow in the footsteps of Seattle, Detroit and Los Angeles in their municipal enterprises.

# DISCUSSION

## Suggestion Made That Portable Motors Be Used for Orchard Spraying

To the Editor:

Sir—I notice on page 129 of the Feb. 15, 1925, issue of the Journal of Electricity an article regarding orchard spraying and the need for the development of electric motors to handle this business.

I am wondering if it would not be possible to use small spray motors developed particularly for this purpose. In other words, would it be cheaper to run cables through the orchard and handle the spraying of the individual trees from a tank using either compressed air or small portable blowers rather than piping the mixture to hydrants throughout the orchard?

Very probably some manufacturers could develop this type of equipment if you think this idea feasible.

H. S. VAILE.

Chicago, Ill.
Feb. 26, 1925.

## Electro-Thermo-Zoologist Required to Answer Questions Raised by Engineer

To the Editor:

Sir—The attached clipping for an A.P. grapevine release is going the rounds of the press. We all know the menace cats are to substations and electric equipment, but some interesting questions might be put to the electrical people.

How many B.t.u. per pound is contained in a cat?

What is the maximum flame temperature from cat fuel?

Do its nine lives have a greater flame temperature or greater B.t.u. value than if it had but one?

### CAT SWISHES TAIL AND LO, POWER QUITS

#### But Poor Pussy Gives Up All of Her Nine Lives to Cut Off City's Lights

KNOXVILLE, IA., Feb. 21.—The light and power service of four Marion county cities was cut off, a big coal mine was forced to shut down and thousands of electric washing machines, percolators, toasters, stoves and curling irons were rendered useless for three hours as the result of a misguided swish of a curious cat's tail today.

Not being satisfied with the view from back fences, the old cat climbed a telephone pole six miles north of Knoxville. While standing with its forefeet on a copper wire carrying 44,000 volts it carelessly moved its tail, which came in contact with the ground wire. Thomas' nine lives went up in smoke. The wire was melted by the intense heat and the entire transmission system of the Marion County Electric Company was cut off.

While a repair crew worked for three hours to fix the damage, the cities of Knoxville, Pleasantville, Melcher and Dalas were without electric power and the Consolidated Indiana Coal Company's big mine was shut down.

Which of its nine lives has the greatest thermal value?

In consuming a nine-life cat is the oxygen requirement for combustion greater or less than other fuels?

Is complete combustion necessary for its maximum heat value?

It looks like you might get a number of electro-cat-thermal-metallurgical questions before the people in emphasizing the cat menace. Why not have a "cat catcher" on the job?

LETSON BALLIET.

Tonopah, Nev.,
Feb. 23, 1925.

VALLEY of the Bridge River in southern British Columbia. An exhaustive survey of the power possibilties of the basin was made during 1924 by the British Columbia Electric Railway Company, Ltd. The company is considering development of power on the river which flows into the Fraser River, from the west, at a point near the city of Lillooet.

# Electrical Features of the New Long Beach Steam Plant

By G. A. Fleming* and E. R. Stauffacher†
Southern California Edison Company, Los Angeles

*LONG BEACH No. 2 plant of the Southern California Edison Company, with an installed capacity of 70,000 kw., is the largest steam generating plant west of the Mississippi. Designed and constructed by Stone & Webster, Inc., it includes many new and unique features in steam-plant practice. Some of these are described in this article.*

THE completion of Long Beach Steam Plant No. 2 in January added 70,000 kw. to the generating capacity of the Southern California Edison Company. This brings the generating capacity of the system to 465,000 kw., 40 per cent of which now is derived from steam and 60 per cent from hydroelectric power.

The units of the new station are two 35,000-kw. General Electric Curtis turbo-generators, the largest of any west of the Mississippi. A new building has been erected adjacent to but separate from the older plant now known as Long Beach No. 1. The old plant is approximately equal in capacity to the new plant but contains six units. A study of these two stations will show the remarkable development in steam plant design that has taken place since Plant No. 1 was constructed, a period of only fifteen years. The old plant when built was noted for its high operating efficiency.

This development is perhaps most noticeable in the steam equipment which results in a 40 per cent saving in fuel and a consequent large saving in dollars to each consumer. But changes in the method of handling and controlling the electric power are also extensive. The electric art has developed so rapidly that it was desirable and economical to combine the control of both plants on a single new switchboard and to gather the power from the two stations on a common and modern bus structure before transmission to the distributing points.

There were several reasons for the selection of the Long Beach site:

1. Industrial growth in the past few years to the south of Los Angeles and in and about Long Beach has shifted the system load center so that Long Beach is a logical location as regards the system load requirements.

2. The Long Beach site is located on the ocean front so that it is a comparatively simple matter to make use of sea water for condenser cooling.

3. The company owned vacant land adjacent to its No. 1 plant and by acquiring a small additional area a considerable saving in real estate was made.

4. By having two plants so close together considerable saving in operating expense could be realized.

By nature of the wide departure in the design of generators, boilers, and switching equipment it was deemed advisable to make the new plant an entirely separate installation instead of an extension to the old plant; the turbines and generators being of much larger capacity and horizontal type would not fit into the building which was designed for the old vertical machines. Also the boilers are very much larger and carry higher steam pressures which made their connection to the old steam system entirely out of the question; hence their separate and independent installation. The concentration of so large an amount of power made it necessary to replace all of the outgoing 60,000-volt line switching equipment with oil circuit breakers of larger interrupting capacity. It was therefore decided to build a complete new switchhouse to acommodate the four present 60-kv. feeders, as well as four new circuits.

Stone & Webster, Inc., of Boston were the engineers in charge of design and construction and fully maintained their reputation of speed and ability to meet a set date for operation.

The general layout and the electric connections are well illustrated in the accompanying diagrams. The simplicity of the main power circuits is evidenced by comparison with the auxiliary equipment. Power is generated at 11-kv. and stepped up to 66 kv. through unit transformer banks without the use of any primary bus or switches. Elimination of these expensive and massive structures is possible with modern high-tension circuit breakers which assure proper action for both automatic and synchronizing operations. The high inherent reactance of the transformers prevents excessive current passing to or from the generator circuits in case of insulation failure. The careful design and rigid construction of the generators, transformers and oil circuit breakers guarantee against their destruction with even the most severe system troubles. The circuit breakers are rated at 1,200,000-kva. interrupting capacity. This rating represents the largest circuit breakers built up to this time for this class of service. These breakers, however, will be stressed approximately to their full rating when clearing severe system short circuits.

To insure continuity of service at all times, the need for maintenance has been reduced to a minimum by the station and equipment design which is such that the necessary maintenance work is readily handled. The generator conductors are doubly insulated by the use of cable covering and by porcelain supports, and are so located that all sections are ac-

*Electrical Designer
†Protection Engineer.

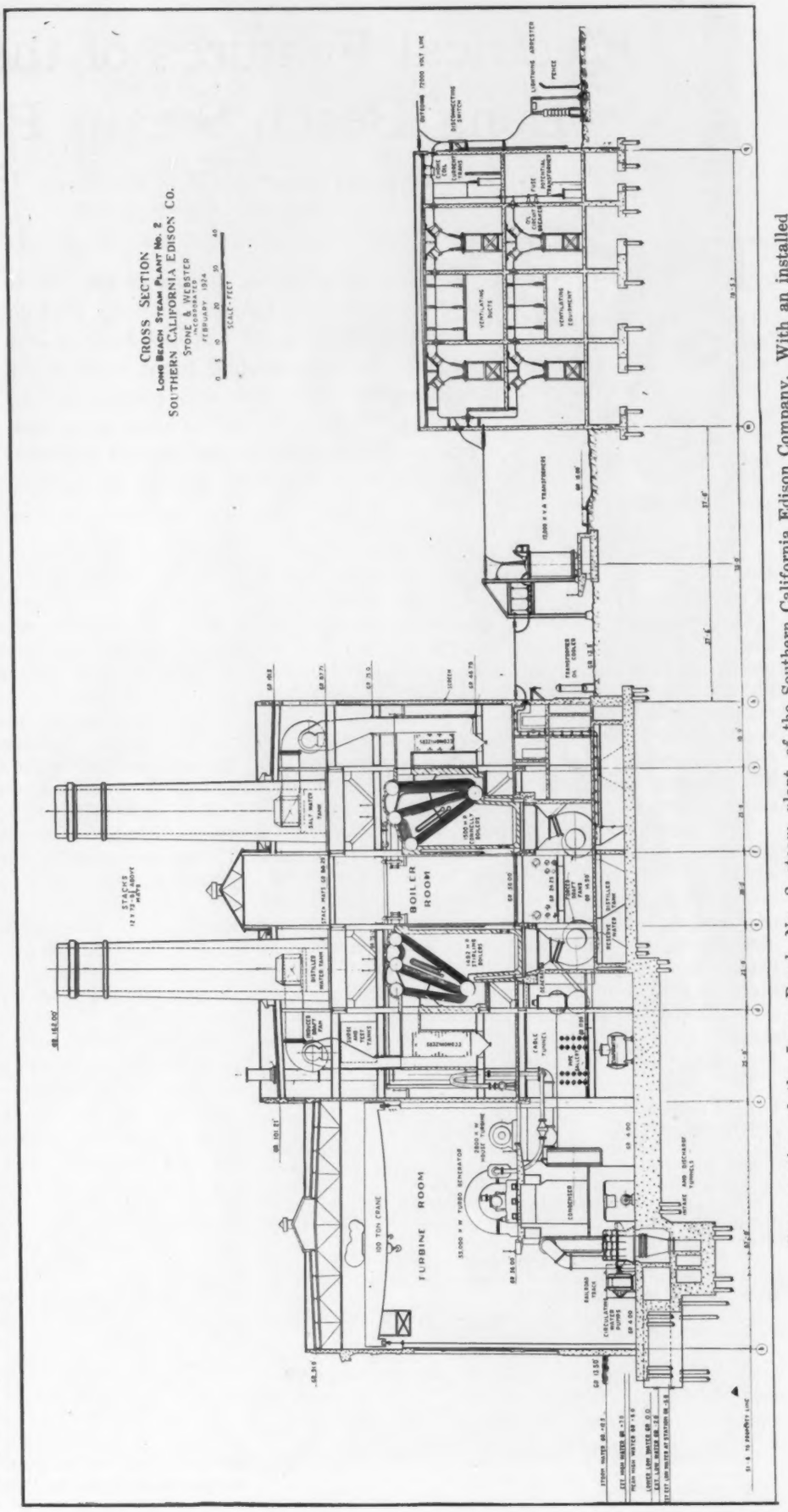
cessible. The 66,000-volt equipment is in duplicate, thus allowing regular inspection and maintenance of all parts. The placing of this high-voltage equipment indoors may seem to differ from late practice, but it was considered advisable due to the location of the plant right on the ocean front. To prevent the spread of possible fire from the oil-filled circuit breakers, they are placed in separate rooms with oil curbs and fire doors. Remotely controlled fire extinguishers are installed for fighting oil fires in the switch rooms.

The generators are entirely closed machines. The air in the housing is cooled by water coils or radiators located in the generator pit, the coils being cooled by circulating sea water through them. The windings within the machines are thus free from dust, and clean air is circulated through them at all times. This should add materially to the life of insulation and windings. A further advantage in the closed system is the effective and easy means of smothering fire occurring within the generator housing.

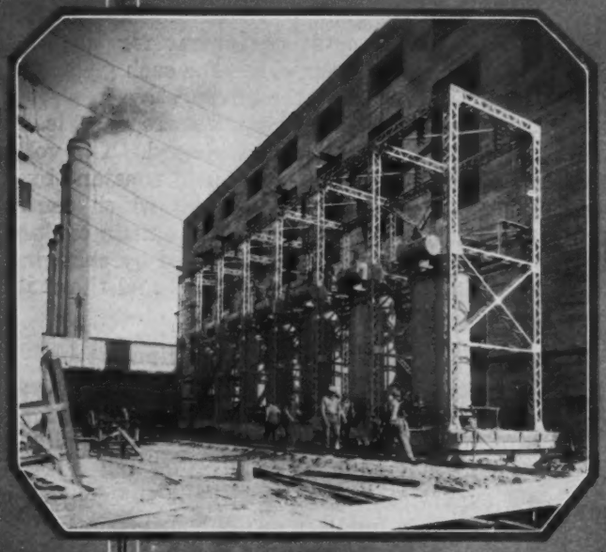
The main transformers are General Electric Company forced oil-cooled, with three 13,000-kva. single-phase units in each bank. A spare is located between the two banks in such manner that it readily can be connected in place of any one of the other six.

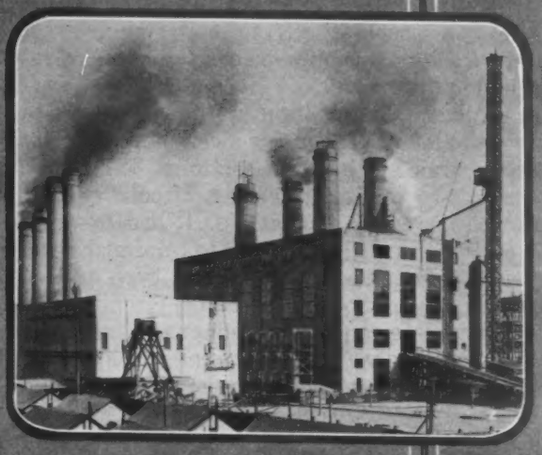
To assure the circulation of oil at all times, an elaborate system of pumps has been installed that provides for automatically bringing in a spare pump should any one pump fail to operate properly.

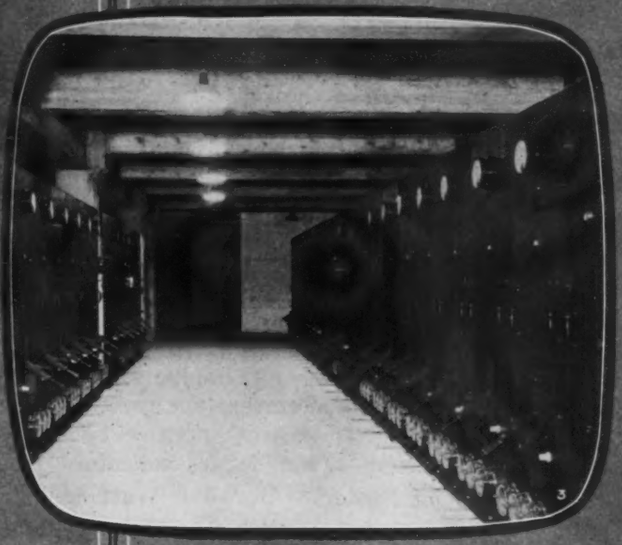
The power required for auxiliary pumps and equipment in a modern steam plant is so extensive and diversified that its control is more complex than that



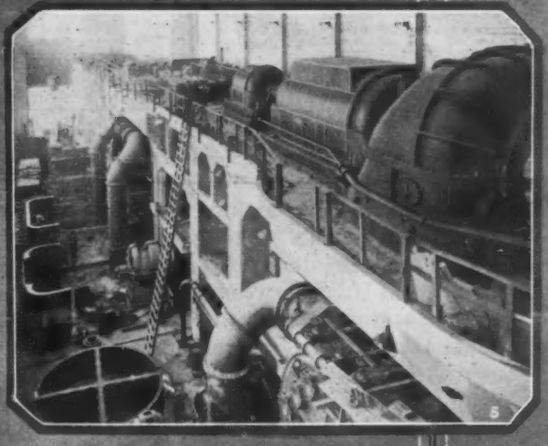

Cross section of the Long Beach No. 2 steam plant of the Southern California Edison Company. With an installed capacity of 70,000 kw. in two units, this is the largest steam station west of the Mississippi.



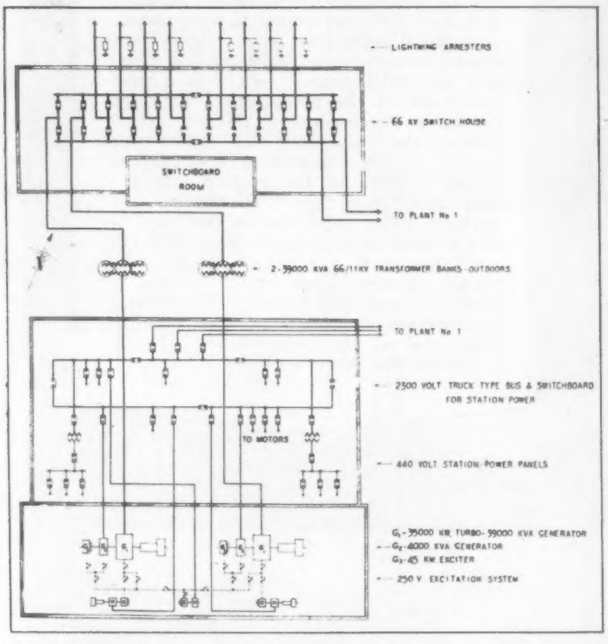




MODERN steam plant practice is embodied in every detail of the new Long Beach plant of the Southern California Edison Company at Long Beach, Calif., as shown in the accompanying illustrations. No. 1 shows the 66-kv. transformers between the plant and the switchhouse. No. 2 is a general view of the new station with the old Long Beach plant at the left. No. 3 shows the assembly of truck-type switch panels controlling the various motor circuits in the station. Induction-type relays are mounted on the bottom of the panels below the handles of the manually operated circuit-breakers. No. 4 is a view of the switchboard. Power from both stations is handled from one board. The visual annunciator system is shown on the right end of the switchboard. No. 5 shows the interior of the station.



of the main power circuits. This station is provided with two 2,300-volt, 4,000-kva generators that serve all auxiliaries. These house generators are mounted on the shaft common to their respective main units and feed a truck type bus and switch assembly which, with its connections, forms in itself a respectable little power system. Here again care has been taken to guard against interruption of service by arranging the 2,300-volt bus as a complete ring divided by circuit breakers into five sections. The two house generators, together with three circuits which can deliver power from station No. 1, are arranged in these sections in such a way as to minimize interference with service regardless of the type or location of trouble. The house generator circuit breakers and the complete control of the house generators are handled electrically from the main switchboard. All motors of 50 hp. and over are served at 2,300 volts either on separate circuits from the station bus or in carefully selected groups. All motors in the station, excepting one 500-hp. unit, are of the full-voltage-starting type of induction motor, and are individually controlled by push buttons and magnetic contactors. These motors are mainly of single and double squirrel-cage construction, but where variable speed is necessary wound-rotor and brush-shifting motors are used.


LIGHTNING ARRESTERS
66 KV SWITCH HOUSE
SWITCHBOARD ROOM
TO PLANT No 1
2-39000 KVA 66/11KV TRANSFORMER BANKS OUTDOORS
TO PLANT No 1
2300 VOLT TRUCK TYPE BUS & SWITCHBOARD FOR STATION POWER
TO MOTORS
440 VOLT STATION POWER PANELS
G1-35000 KW TURBO-39000 KVA GENERATOR
G2-4000 KVA GENERATOR
G3-45 KW EXCITER
250 V. EXCITATION SYSTEM

Single-line wiring diagram of the new Long Beach steam plant and switchhouse

Power for motors of less than 50 hp. is supplied from the 2,300-volt bus through two banks of 2,300/440-volt transformers. These banks each feed a bus and a dead front switchboard assembly of hand-operated automatic trip oil circuit breakers which divide the circuits for the smaller equipment in the plant.

Excitation for the main units is from three 250-volt exciters, one of which is of sufficient size to supply both generators while the two smaller are each sufficient only to supply one unit. The exciters for the 2,300-volt station generators are directly connected with the generator shafts. The circuit breakers and the rheostat equipment for the units are divided into two groups, one for each generator unit, and are located near their respective machines. All circuit breakers and rheostats are electrically controlled from the main switchboard. The voltage of the 2,300-volt generators is held constant by means of automatic voltage regulators which control the exciter fields. The voltage of the main exciter units is hand-controlled only and varied by changing both the resistance in the exciter field and the main generator field circuits.

### Switchboard and Equipment

A room 48 ft.x28 ft. is provided for the main switchboard. This room is on the second floor of the high-tension switchhouse and is far enough from the engine and boiler rooms to fulfill its function as a supervisory station without the confusion and noise so often found in switchboard rooms.

All controls are on the sloping and small vertical section of the bench board. They are multiple-contact drum type switches with the usual lamp indicator arrangement for both circuit breakers and rheostats. Meters are mounted on the front vertical section and are of the round-face white-dial design. They are placed high enough to make them visible over the top of the bench board. The necessary transfer switches are on the lower sections. Relays and recording instruments are mounted on the rear panels of the vertical board.

The following lists indicate the instruments used for the various services:

Generators—Voltmeter, Ammeters, a.c.; Neutral ammeter, Field ammeter, Exciter voltmeter, Watt meter, Watt-hour meter, Graphic watt meter, Temperature indicator, Temperature recorder, Governor position indicator.

Transformers—Temperature indicator.

Outgoing Feeders—Ammeter, Watt meter, Watt-hour meter.

General—Totalizing graphic watt meter with remote indicating sender to watt meters in generator and boiler room.

Synchroscope with lamps and two voltmeters. Frequency indicator.

To facilitate the control of the steam equipment, a visual signal has been installed. Push-button switches at both the switchboard and generator floor control lights behind a glass plate on which are printed such words as: Start Generator; On Governor; Emergency and the like. A similar signal box, but without control, is also placed in the boiler room to the end that all persons interested may act in unison during any major plant operation. A demand indicator for signaling expected loads to the generator and boiler rooms is also installed.

### Relays and Allied Equipment

To protect against unnecessary or prolonged serious interruptions and to keep damage to electrical apparatus at a minimum in case of breakdown, a complete installation of protective relays is used

throughout the plant. The main generators are protected by induction type-relays differentially connected against extensive damage in case of internal electrical trouble which might develop. This application of protective relays is the usual method of protecting these large generators throughout American central station systems today. If for any reason trouble should develop in the plant exterior to the generators, it is necessary that these generators be automatically dropped off the line in the event that any of the other protective devices should not function as anticipated. For this contingency, generator overload relays are provided having the time limit adjusted for comparatively long periods. The main transformers are protected against internal trouble by means of differentially connected induction-type relays, and in addition overload relays are provided. The differential-relay schemes used for the protection of both generators and transformers include in the alternating current circuit the major portion of the generator conductors and both the low and the high-tension bus. Experience has shown that faults to ground within the power house are fully as likely to develop on the cables and on the structure of the bus as within the generating and transformer units. Consequently differential protection was provided so that such faults could be cleared as readily as if the trouble had developed within the units.

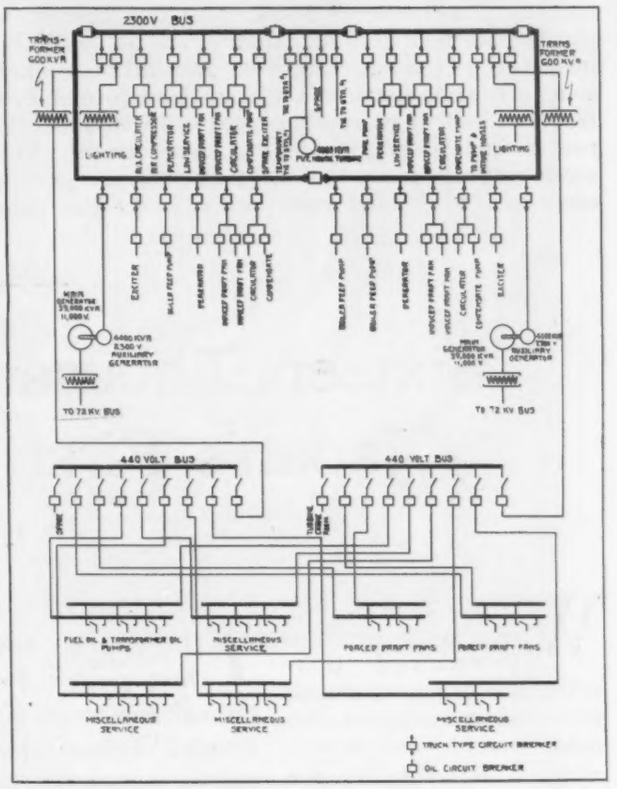
The outgoing 66-kv. feeders are equipped with induction-type overload relays so set that they will function in conjunction with the protective relays throughout the 66-kv. net work in case of transmission line failures. In this scheme Long Beach No. 2 is considered as a major generating source. The outgoing 60-kv. feeders go to the following substations: Cudahy, Somerset, Signal Hill, Carson, Watson, Laguna Bell and State Street, two of the feeders going to State Street. In the case of two parallel lines going to the same substation, use is made of current balanced relays. This type of relay has proved quite valuable in isolating faults in other portions of the 66-kv. net work where parallel lines are used.

### Location of Relays

The relays which are used to protect the major equipment and the lines are located in the main switchboard room and mounted on a separate set of panels in the rear of the main switchboard. Oil circuit breakers are provided with a special alarm contact which operates an annunciator when the circuit breakers open for any reason other than by switchboard control. The annunciator signal indicates a group to which the circuit breaker belongs and quickly draws the operator's attention to the automatic operation and the trouble. In addition, annunciator contacts are provided for signaling high temperatures in generators and transformers, and provision is made to keep a permanent record of the transformer temperatures by means of a record curve-drawing instrument.

For the protection of the 2,300-volt auxiliary equipment in the plant, such as the house generators and the various motor-driven machinery which are supplied with motors above 50 hp. capacity, induction-type relays are provided for each circuit. While the house generators are handled from the main switchboard, the various motor circuits are controlled and protected by an assembly of truck-type switch panels. The oil circuit breakers for these feeders are hand-operated with induction-type relay trip circuits and are further equipped with the necessary contacts so as to sound an alarm in case of automatic opening. The motors of less than 50 hp. capacity operate at 440 volts and are protected in groups by means of induction-type relays and oil circuit breakers.

Provision was originally made for grounding the neutrals of the winding of the two 4,000-kva. 2,300-volt house generators. The grounding of the neutral of the generator winding is of advantage in isolating this generator from the system in case of internal troubles, but it is felt that there would be greater danger of accidental ground occurring on various portions of the electrical circuits fed from these generators than within the generators themselves. Under conditions of a ground on one of the circuits a severe short circuit would result in case of the generator neutral being grounded, whereas if the generator neutral were not grounded it would be necessary for two exterior grounds to exist simultaneously before a short circuit would develop. Instead of grounding the neutral it was decided that a reliable type of ground indicator should be installed on this 2,300-volt bus so that circuit grounds might be indicated and removed before serious trouble would result.




Single-line wiring diagram of station auxiliary service at new Long Beach steam plant.

### Grounding

In a station the size of Long Beach No. 2 it is quite necessary to provide an adequate electrical ground system. At this plant the grounding system might be classified in two divisions:

A—One to form a neutral copper bus to bring the ground current as directly as possible from the point of trouble to the neutral of whatever machine to which it may have a tendency to flow. And

B—To ground the structural steel and hardware so as to hold it at a common earth potential at the time of a short circuit to ground.

The main ground bus is of variable size, dependent upon the current that could be expected in its different sections in case of trouble. A copper conductor consistent in size with the generator leads is carried from the neutral of the generator to the generator frame and then parallels the generator leads to the case of the main transformers. The connection of this grounding bus to ground rods is incidental as it forms a conductor independent of the earth return usually relied upon. In a similar manner, the neutral of the transformer bank connections (on the star-connected 66-kv. side) is connected to the transformer case and to the base of all 66-kv. insulators of the bus structure. In addition, connections are made between the main transformer neutral and the frames of all oil circuit breakers and the neutral and cases of instrument transformers. This section of the ground, or neutral, bus is carefully connected to ground rods located near the main transformer banks. This latter provision is made so that ground currents, due to a transmission-line short circuit, will reach their normal destination, the transformer neutral, without passing through any station equipment or structural steel. To prevent any chance of ground current reaching the switchboard, the neutrals of the instrument transformers are grounded at these transformers, and no common or ground bus is used at the switchboard. The building ground is a continuous copper conductor that grounds the building steel at a large number of points. All hardware with which the operators may come in contact, such as the frame of the switchboards and instrument cases, is also grounded to this building ground.

To protect against excessive voltage disturbances on the 66-kv. outgoing feeders, outdoor-type oxide-film lightning arresters are provided on each line. These arresters are located on the north side of the switchhouse under the 66-kv. feeders.

At Long Beach No. 1 Steam Plant the 11-kv. bus is being rebuilt and strengthened. The old General Electric "Type H" oil circuit breakers, which were installed about fifteen years ago, are being rebuilt so as to increase the rupturing capacity. Current-limiting reactors rated at from 300 to 500 amp., 5 per cent, 11.6-kv. are being installed on all of the outgoing feeders. The various airbreak disconnect switches are also being equipped with locks so as to prevent a recurrence of blowing open at the time of a severe 11-kv. short circuit.

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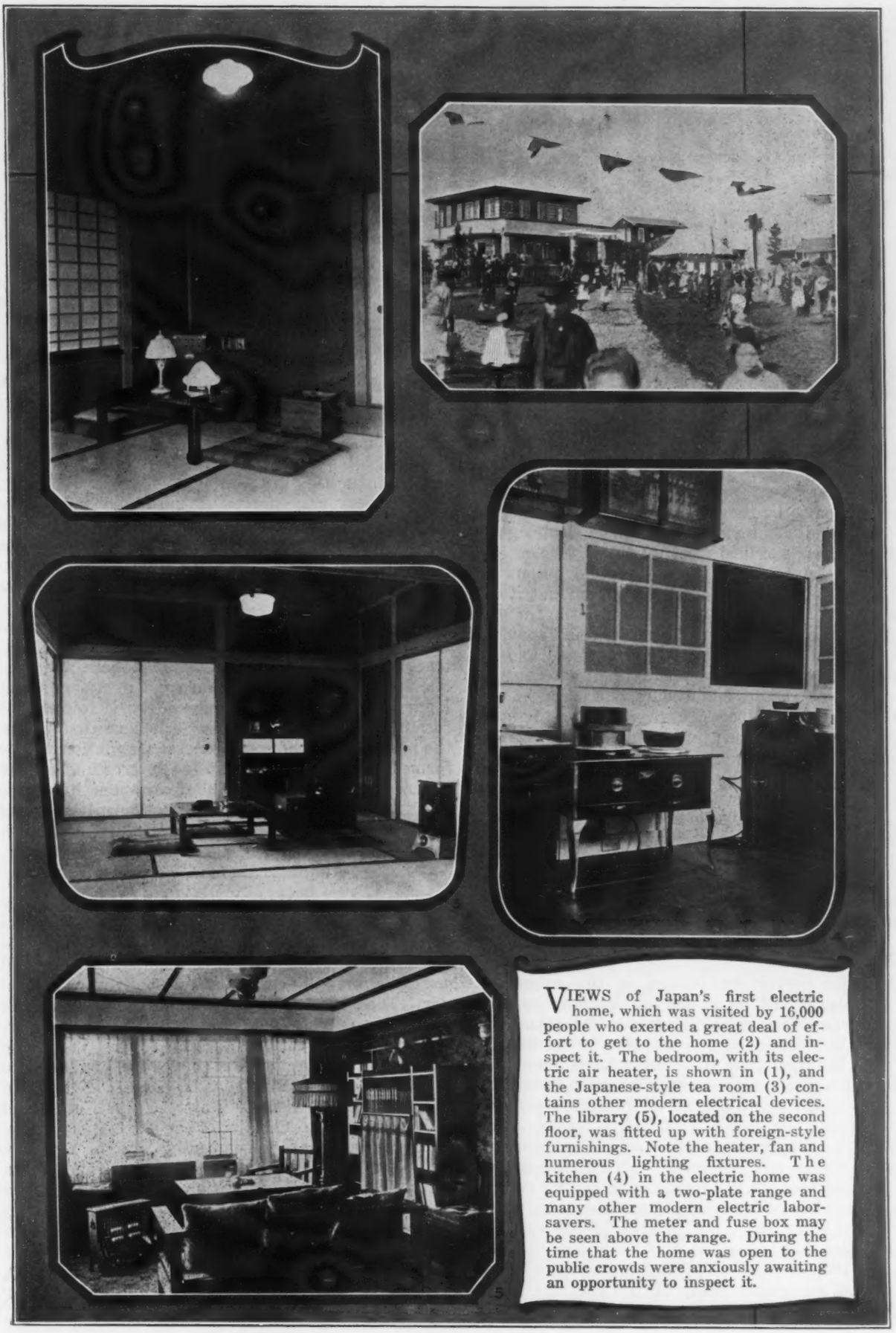
# Sixteen Thousand People Inspect Japan's First Electric Home

By F. D. Fagan
Tokyo Electric Company, Tokyo, Japan

*THE erection and exhibition of Japan's first electric home was made possible through the cooperation of a number of interested Tokyo firms. The fact that there was no association composed of members of the electrical industry at the time of the display speaks well for the organizers of the group sponsoring the electric home. Sixteen thousand persons visited this home, which was a distinct novelty to a country where electricity is destined to play an important part.*

WHEN Japan's first electric home was proposed there seemed to be no association under whose auspices this home could be demonstrated. A committee was appointed by the sales manager of the Tokyo Electric Company, and after a few weeks' investigation arrangements for building and displaying it had been made with a building company, a real estate company, one of the leading newspapers of Tokyo, the the Tokyo Nichi Nichi, the electric street car company, a department store, a manufacturer of electrical heating and cooking devices, a lamp manufacturing company and the Tokyo Electric Company. These companies formed a committee and arranged for the division of expense and investment in the building of the electric home, and the real estate company agreed to take over the home at the expiration of the demonstration period. Construction work on the home was started in June, 1924.

The home, as designed by the committee, consisted of entrance hall, living room (foreign style) sun parlor, dining room, kitchen and bath room (Japanese style) on the first floor. The second floor was designed (foreign style)



VIEWS of Japan's first electric home, which was visited by 16,000 people who exerted a great deal of effort to get to the home (2) and inspect it. The bedroom, with its electric air heater, is shown in (1), and the Japanese-style tea room (3) contains other modern electrical devices. The library (5), located on the second floor, was fitted up with foreign-style furnishings. Note the heater, fan and numerous lighting fixtures. The kitchen (4) in the electric home was equipped with a two-plate range and many other modern electric labor-savers. The meter and fuse box may be seen above the range. During the time that the home was open to the public crowds were anxiously awaiting an opportunity to inspect it.

for a library and a bedroom (Japanese style). A pump supplied water from a well, and the laundry in a building separate from the house was equipped completely with electrical devices. All of the rooms of the home were furnished and completely fitted out with electrical devices for lighting, heating and cooking. A complete electrical installation, including a two-plate electric range was made in the kitchen.

**Eighty Guests Attend Formal Opening**

On Oct. 11, 1924 the opening ceremony was held. About eighty invited guests attended, it not being customary to open such affairs by inviting the general public. Viscount Shibusawa, one of the best known men in Japan, made a short opening address and closed the switch, thus supplying the house with electricity. Many prominent officials, college professors and leading members of the electrical industry were at the opening ceremony. The home was opened to the public Oct. 12.

On that day a large group of ladies, especially invited by the Tokyo Nichi Nichi, inspected the electric home and listened to lectures on home lighting and home building. On Oct. 16, the dealers of Tokyo were invited to be the guests of the Tokyo Electric Company and, after visiting the home electric, took part in a track and field meet which all were entitled to enter. Approximately one thousand dealers accepted the invitation in spite of the fact that it was a rainy day. This was the first gathering of electrical contractors and dealers ever held in Japan. It was reported as a very successful day and had the expected effect of bringing about a better feeling between the contractors and dealers.

On Oct. 26 the Princess Dowager visited the home electric and was much interested in the various demonstrations of the use of electricity in the home. A lecture on electrifying the home was given Oct. 29 in one of the large meeting halls near Uyeno Park, and several hundred people attended. Many prominent visitors were reported as having visited the electric home during the time it was open, among them being Viscount Shibusawa, Baron Mitsui, Mr. Nakamura, mayor of the city of Tokyo, Dr. G. Yamakami, Dr. Yamamoto, Dr. B. Natomi, Dr. K. Kishi and Y. Kamata, former minister of the department of education.

The home electric was located in the suburb of Tokyo called Chofu, on an electric traction line running between Kamata and Meguro. The reason for selecting this particular site was that it was not the desire of the committee to secure a large number of visitors who were only curious when the real aim was to secure the attendance of interested persons. As the fare from the city of Tokyo was from 25 cents to 35 cents, it was felt that all visitors were interested parties and not merely curious spectators. The weather was not as favorable during the twenty days as could have been desired as there were seven cloudy and rainy days, but in spite of the weather and the fact that it was the first home electric to be held in Japan there were 16,000 visitors to the home, the largest attendance being on the last day when 2,636 people were admitted. The smallest attendance recorded was on a day when there was a pouring rain and only 44 people were shown through the home. During one week of the time the electric home was open a special home-electric demonstration was held by the Mitsukoshi department store, which was interested in the exhibits. This demonstration consisted of a Japanese home completely equipped electrically. It is estimated that in excess of 150,000 people visited this demonstration.

The general opinion of all interested was that the electric home was a great success, and those investing money and sharing part of the expense were well pleased with the result. There were in attendance Japanese girls trained to talk on the uses of various devices, there being a girl in each room, and as the home was open from 8 a.m. until 8 p.m. two shifts of girls were used.

In Japan it is not customary to open a demonstration of this kind to the public all day. The morning was reserved for invited guests when they were privileged to see the home between 8 and 12.

The home was purchased, prior to its closing day, by Mr. Shibusawa, son of Viscount Shibusawa, and he will make this his permanent residence.

This story may not be of particular interest to American readers, as the home electric idea is an old one in America, but the fact that such progress has been made in Japan is of great interest to those interested in the development of the electrical business in Japan.

Those interested in the electrical industry in Japan have not formed an association similar to the contractors, dealers, manufacturers, jobbers and central stations' associations that exist in America, but I am glad to say that the tendency is toward the forming of such associations. I believe that within the next six months some general association will be formed that will function to the interests of all the electrical industry. The electric home has done much to instill a spirit of cooperation in the minds of the leaders in the electrical fraternity, and much good undoubtedly will be forthcoming.

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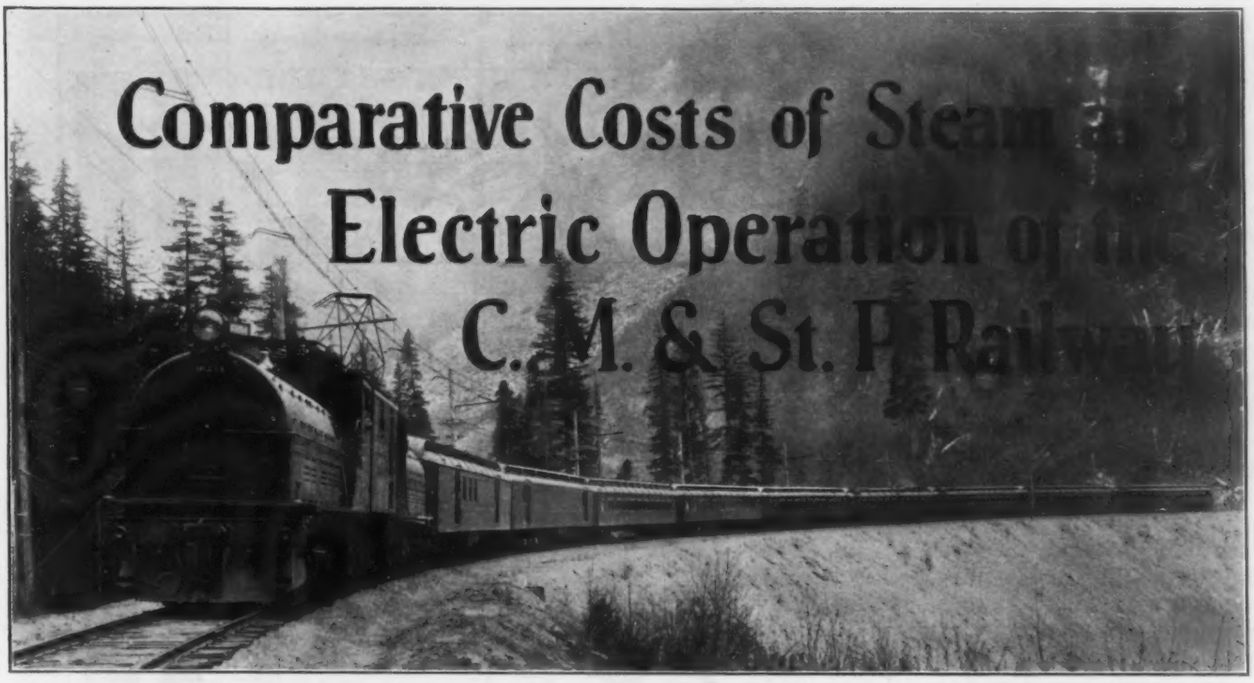
**Great Advance Made by N.E.L.A. in Last Forty Years.**—While the National Electric Light Association convention to be held in San Francisco June 15-19 is the forty-eighth convention, actually it will mark the fortieth year of existence of that organization. The apparent discrepancy in the year and the convention number is accounted for by the fact that semi-annual conventions were held until 1892. The association was organized Feb. 25, 1885, at Chicago in a room of the Grand Pacific Hotel. Eighty odd delegates were present to write the constitution and outline the future activities of the association. Today the organization has a membership of approximately fifteen thousand, several hundred being in foreign countries. Conservative estimates from association officials place the expected attendance at the San Francisco convention around five thousand. Sixteen subjects were considered at the first convention and included such little known topics as "Incandescent light, particularly in regard to length of circuit upon which they can be run with a profit."



# Comparative Costs of Steam and Electric Operation of the C. M. & St. P. Railway

*ELECTRIC operation of the Chicago, Milwaukee & St. Paul Railway Company on its Western extension over the mountain ranges in Montana, Idaho and Washington, because it is by far the most extensive operation of its kind ever undertaken—consisting of 650 miles of main line railway where all train movements, switching, freight and passenger, are performed exclusively by electric power — has attracted world-wide attention from those who are interested in the development and use of hydroelectric power as a substitute for steam power in railway transportation.*

*The mechanical features of the electrification and their advantages over steam operation are readily recognized from an inspection of the plant, but the vital inquiry of investigators as well as those financially interested in the company has been whether and to what extent there are economic advantages in electric operation versus steam operation.*

*A careful study of the cost of operation under steam on the identical districts which were afterward electrified has been made. It is based on an actual calculation of all the costs involved in both methods of operation and we believe it reflects accurately the relative costs of each. Only the direct advantages of electric operation have been taken into account. There are many incidental advantages and economies in electric operation which may not have been enumerated because of the difficulty in arriving at an accurate measurement of their values.*

*H. E. BYRAM, President,*
*Chicago, Milwaukee & St. Paul Railway Co.*

ELECTRIFICATION of the main line of the Chicago, Milwaukee & St. Paul Railway Company on its Rocky Mountain division between Harlowton and Avery, Mont., commenced in 1914. By November, 1916, electric operation on 438 miles of main line and 128 miles of additional trackage on this division was an actuality. Subsequently—in March, 1920,—the division between Othello and Tacoma, Wash., comprising 208 miles of main line and 72 miles of other line, was electrified. In the interim between April, 1916, when the first section of electrified road began operating there has been an actual saving of approximately $12,400,007 in favor of electrification, or nearly 80 per cent of the total cost of the change from steam to electric power. The method of arriving at this figure is the subject of this article which reviews a report just issued by H. E. Byram, the president of the road.

Direct-current, 3,000-volt, overhead trolley type of electrification is used. Current is purchased by the railway company at taps in the company's high-tension transmission system, transmitted to substations where it is stepped down from 3-phase alternating current at 100,000 volts to 2,300 volts and thence converted through motor-generator sets to direct current at 3,000 volts for distribution to the trolley. The motors of the locomotives follow the regenerative principle, acting as generators when descending grades, thus returning current to the line and controlling the speed of the train without excessive use of mechanical brakes.

The extent of the electrified system and some of the pertinent physical features are shown in Fig. 1.

The method employed in arriving at the saving effected through electrification was to compare the cost of steam operation in 1923, had this form of operation been employed on the electrified systems, with the actual cost of electric operation for that period. The cost of steam operation was based upon the actual cost of operation during the last twelve months such operation was in effect, adjusted to the costs obtaining in 1923. Under either method of operation, some costs, within reasonable limits remain constant while others vary with different volumes of traffic. Consequently ad-

justments were made to compensate for changes in traffic and operating conditions between the period of steam operation and 1923. Figures used in making the comparision include only the operating expenses and the carrying charges of the investment in property directly affected by the change in power. Costs common to both steam and electric operation are excluded.

No savings were credited to electric operation which were not directly ascertainable as, for example, the possible increased revenue due to the release of equipment used in transporting coal under steam operation. Similarly, no credit was given electric operation for the better utilization of freight equipment due to faster movement, less wear and tear on road and equipment, reduced station expense and similar expenses affected by the number of trains required to handle a given tonnage. In the case of all these items it was impossible to determine an exact monetary value for these incidental advantages. In the same way, no credit was given for the increase in passenger revenue resulting from the attractiveness and greater comfort of travel under electrified operation.

Yet despite these savings which cannot be expressed in terms of dollars and cents, an actual economy of $12,400,007 has resulted from electric operation. This is shown in Table I. The net savings shown for any one year were obtained by deducting from the savings in operating expenses the carrying charges of interest and depreciation on the additional investment required for the electrification, which amounted to $15,625,739.

In Fig. 2 the costs of electrical and steam opera-

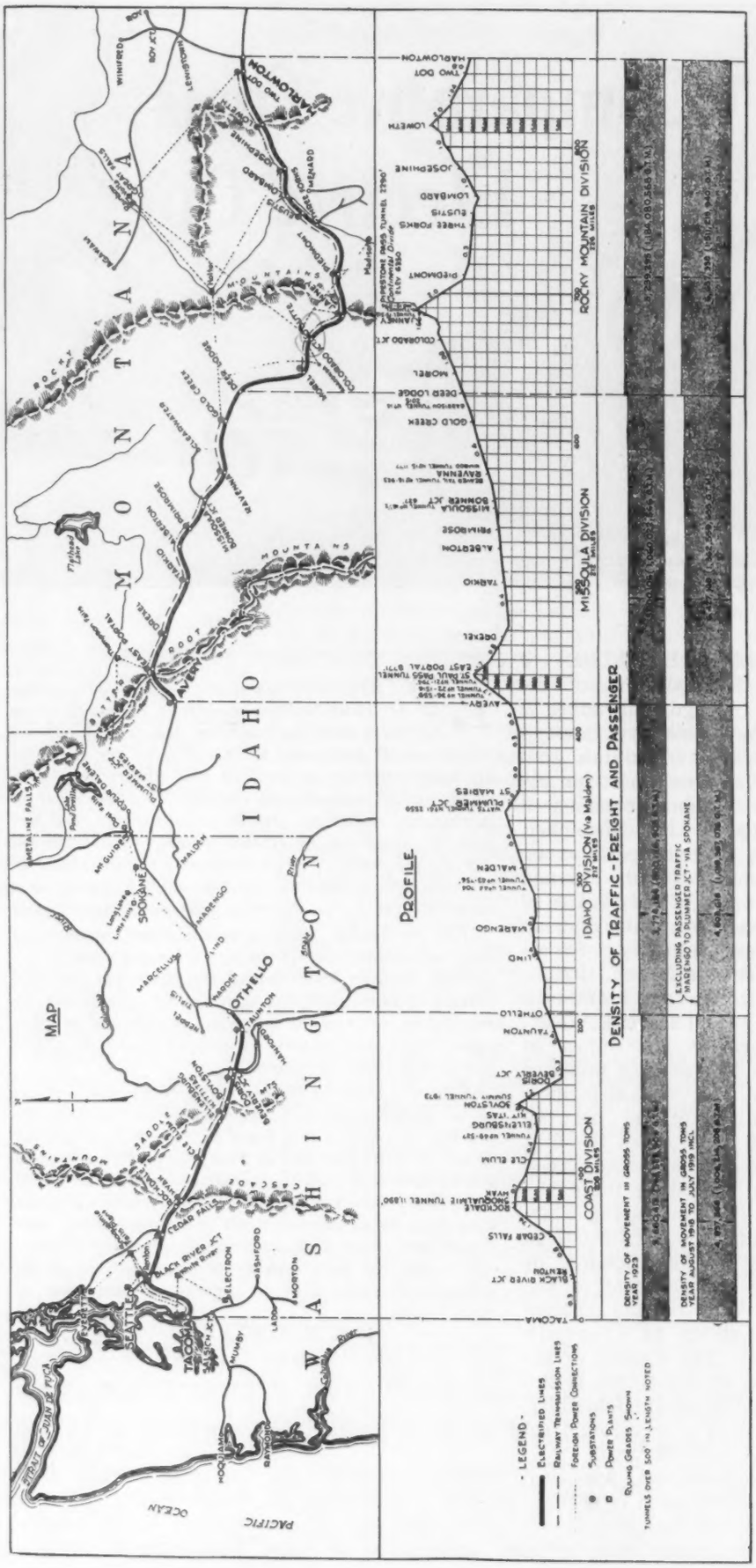



Fig. 1.—Condensed map and profile of electrified lines with density chart of gross tonnage movement.

**Table I.**

| Years | Harlowton to Avery Electrical Operation began April and Nov., 1916 | | Othello to Tacoma Electrical Operation began March, 1920 | | All Electrified Sections | |
|---|---|---|---|---|---|---|
| | Volume of Traffic-Gross Ton Miles Frt. and Pass. | Net Savings by Electrification | Volume of Traffic-Gross Ton Miles Frt. and Pass. | Net Savings by Electrification | Volume of Traffic-Gross Ton Miles Frt. and Pass. | Net Savings by Electrification |
| 1916 | †1,639,054,000 | †$ 1,098,166 | | | 1,639,054,000 | $ 1,098,166 |
| 1917 | 2,677,097,000 | 1,641,369 | | | 2,677,097,000 | 1,641,369 |
| 1918 | 2,759,178,000 | 1,734,687 | | | 2,759,178,000 | 1,734,687 |
| 1919 | 2,894,063,000 | 1,888,037 | | | 2,894,063,000 | 1,888,037 |
| 1920 | 2,710,745,000 | 1.679,623 | *691,674,000 | * $249,003 | 3,402,419,000 | 1,928,626 |
| 1921 | 1,812,714,000 | 658,651 | 664,238,000 | 12,363 | 2,476,952,000 | 671,014 |
| 1922 | 2,109,868,000 | 996,485 | 734,121,000 | 103,301 | 2,843,989,000 | 1,099,786 |
| 1923 | 2,247,102,000 | 1,152,508 | 746,405,000 | 119,285 | 2,993,507,000 | 1,271,793 |
| 1924 | 2,129,426,000 | 1,018,721 | 691,476,000 | 47,808 | 2,820,902,000 | 1,066,529 |
| Total | | $11,868,247 | | $531,760 | | $12,400,007 |

†Tonnage and savings for 6½ months.
*Tonnage and savings for 9 months.

tion and the differences in the method of distribution of the costs are shown graphically for the volume of traffic as of the year August, 1918, to July, 1919, inclusive. Only such operating expenses directly affected by the change in motive power are included. In the construction of these charts the different expenses have been grouped with a view of bringing out clearly wherein each method of operation is the less expensive. They show that for all of the operating costs, with three minor exceptions, electrical operation is the most economical and only in the carrying charges on the investment in property not common to both does it prove more costly. However, the savings in operating expenses are more than enough to offset this difference and to show a substantial net saving in addition.

Such have been the savings that the sections of the line—Black River Junction to Seattle, a distance of 10 miles, and Avery to Othello via Malden, a distance of 212 miles, will without doubt be electrified in time, as electrical operation will not only effect savings on these sections but the continuity resulting will augment the savings on all of the electrified sections.

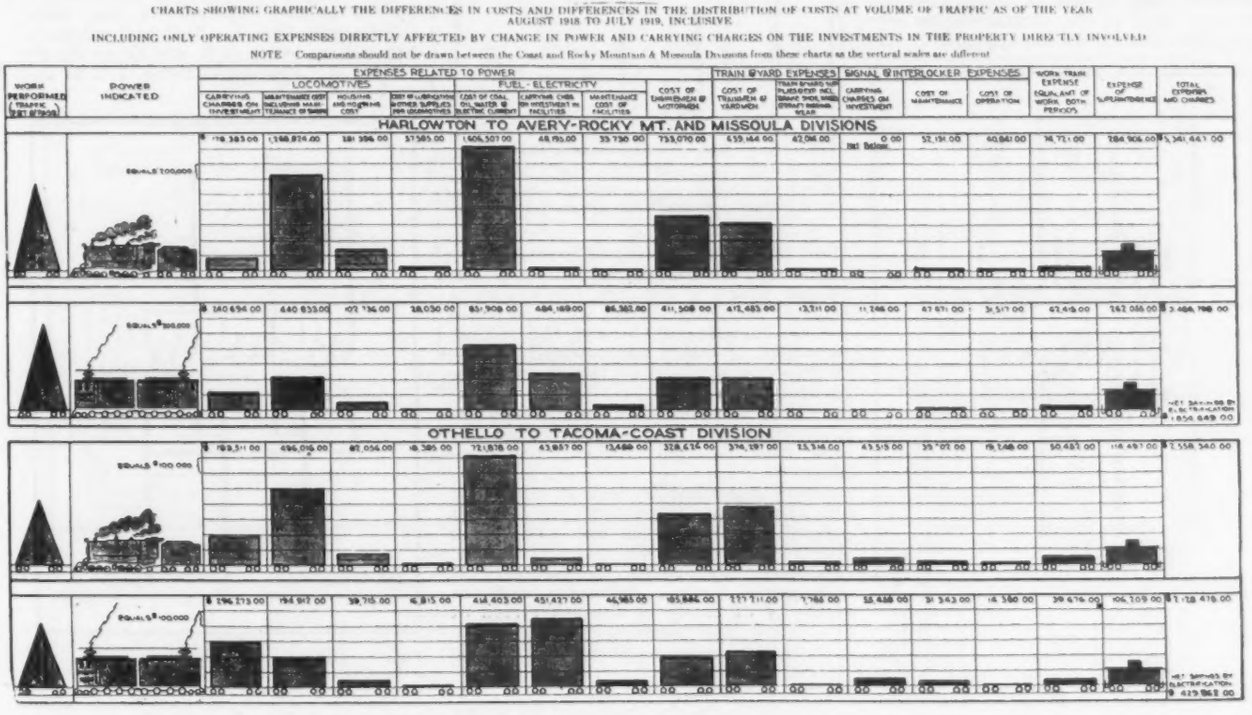

CHARTS SHOWING GRAPHICALLY THE DIFFERENCES IN COSTS AND DIFFERENCES IN THE DISTRIBUTION OF COSTS AT VOLUME OF TRAFFIC AS OF THE YEAR AUGUST 1918 TO JULY 1919, INCLUSIVE
INCLUDING ONLY OPERATING EXPENSES DIRECTLY AFFECTED BY CHANGE IN POWER AND CARRYING CHARGES ON THE INVESTMENTS IN THE PROPERTY DIRECTLY INVOLVED
NOTE Comparisons should not be drawn between the Coast and Rocky Mountain & Missoula Divisions from these charts as the vertical scales are different
WORK PERFORMED (TRAFFIC)
POWER INDICATED
EXPENSES RELATED TO POWER
LOCOMOTIVES
FUEL - ELECTRICITY
TRAIN & YARD EXPENSES
SIGNAL & INTERLOCKER EXPENSES
WORK TRAIN EXPENSE
EXPENSE OF SUPERINTENDENCE
TOTAL EXPENSES AND CHARGES
HARLOWTON TO AVERY-ROCKY MT. AND MISSOULA DIVISIONS
OTHELLO TO TACOMA-COAST DIVISION

Fig. 2—Chart showing differences in cost between steam and electric operation.

# CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

## Simple Rule for Connecting Current Transformers

### Connecting Current Transformers for Differential Protection Facilitated by Simple and Accurate Rule

By LLOYD F. HUNT, Development Engineer, Southern California Edison Company, Los Angeles

Current transformers to function properly for differential protection of star-delta-connected power transformer banks must be connected to maintain the proper relative direction of flow of the secondary current of each unit with respect to the others. This seems to be a proposition that is often viewed with apprehension by those charged with the responsibility of making the installation. However, the making of proper secondary connections is readily reduced to comparatively simple fundamentals.

The following is a short, simple and exact rule for properly connecting the secondaries of current transformers for differential protection of star-delta transformer banks.

First, trace out corresponding incoming and outgoing high-tension leads of the power transformer bank and note the correct polarity of the bank.

Second, star-connect the current transformers on the delta side of the power bank by tying together three corresponding secondary leads.

Third, connect any of the three remaining leads of the starred current transformers to the same relative secondary lead of the corresponding current transformer on the opposite or star side of the power bank. That is, if the lead selected emerges from the current transformer on the side nearest the power bank it should be connected to the lead near the bank on the corresponding current transformer on the star side of the power bank, and vice versa.

Fourth, connect this same secondary lead to the relatively opposite secondary lead of the current transformer (on the star side of the power bank) in the phase which is common (on the delta side of the power bank) with the phase of the current transformer, the secondary lead of which was selected for the connection outlined in the above paragraph.

Fifth, complete the connections by following out the above directions for the other two pairs of current transformers.

It is important to bear in mind that in the above discussion the current transformer polarities are assumed to be the same. If the polarity of the current transformers on one side of the power bank is different from the polarity of those on the other side of the bank, the secondary leads of one set must be reversed after applying the above rule.

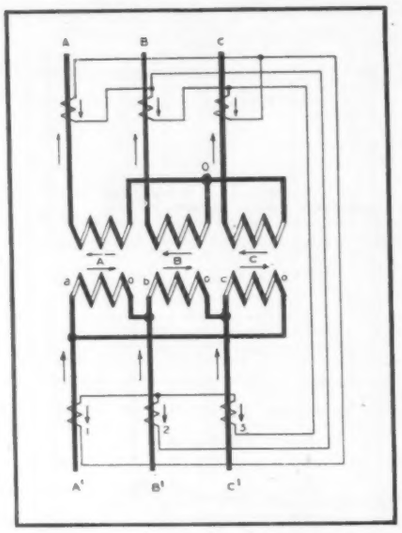



Fig. 1.—Wiring diagram of current transformer connections for differential protection of a star-delta subtractive-polarity power transformer bank. Arrows indicate direction of current flow assuming that power is being delivered through the bank from the delta side to the star side. The letters and figures are for the identification of the various units of current which are shown in their proper vectorial relation in Fig. 5.

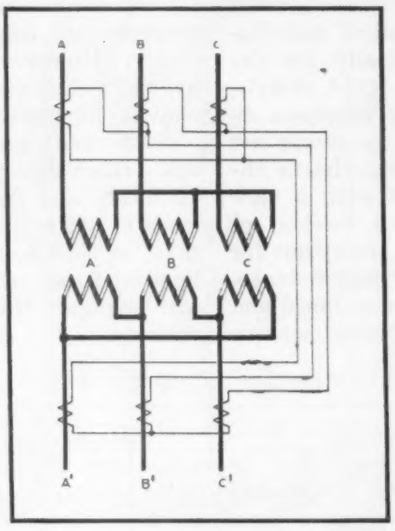



Fig. 2.—An alternate wiring scheme for that shown in Fig. 1, accomplishing precisely the same results. Power bank subtractive polarity.

#### Illustration.

To illustrate this rule and its application refer to Fig. 1, which shows a star-delta power transformer bank with current transformers properly connected for differential protection. The power transformers are of subtractive polarity. Therefore, phase leg A′ corresponds to phase leg A; phase leg B′ corresponds to phase leg B; phase leg C′ corresponds to phase leg C. The current transformers may be starred either as shown in Fig 1 or as shown in Fig. 2.

In the case shown in Fig. 1, the secondary lead of the current transformer in leg A′ should be connected to the outside secondary lead of the current transformer in the corresponding leg A. But phase leg A′ is also connected to the relatively opposite terminal of power transformer "C". Therefore, the secondary lead of the current transformer in leg A′ should also be connected to the inside secondary lead of the current transformer in leg C. Connect the secondary leads of the current transformers in legs B-B′ and C-C′ in the same manner.

Other possible connections equally correct are shown in Figs. 2, 3 and 4.

#### Vectorial Proof

To prove Fig. 1 vectorially, a simple method of using current vectors is given in the following discussion.

Assume current flowing out from the star side of the power bank and flowing in on the delta side of the bank. Then, since the polarity of the bank is subtractive, the current within the delta windings of the bank will be as indicated by the arrows adjacent to the delta windings in Fig. 1. Vectorial relations between currents A, B, and C are shown in Fig. 5. Tracing out Fig. 1 it is apparent that:

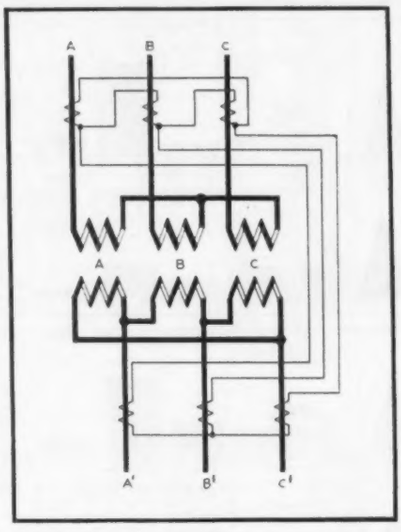



Fig. 3.—Current transformer connections for differential protection of a star-delta additive-polarity power bank where the power bank connections are made up slightly differently from those shown in Figs. 1 and 2. The net results are of course the same.

Current A′ = ao — co = OA — OC;
Current B′ = bo — ao = OB — OA;
Current C′ = co — bo = OC — OB.

The vectorial relations between currents A′, B′ and C′ as taken from the above equations appear in Fig. 5.

Since the current transformer polarity is subtractive and the star connection is made up as shown in Fig. 1, currents 1, 2, and 3 are the same as currents, A′, B′ and C′, respectively.

For the proper actuation of differential relays it is desired to have currents 180 deg. out of phase with which to balance currents 1, 2, and 3. Referring to Fig. 5 for the vectorial relations and to Fig. 1 for the connections, the following discussion will serve as proof of the correctness of the connection methods given in the foregoing rule. Since,

Current 1 = OA — OC, current to balance this, or X = — OA + OC, and, therefore, secondary lead 1 is connected to the outside secondary lead of the current transformer on leg A (this corresponds to the tail of the arrow, or negative lead( and to the inside secondary lead of the current transformer on leg C (this corresponds to the head of the arrow, or positive lead). Since

Current 2 = OB — OA, current to balance this, or X = — OB + OA, and therefore secondary lead 2 is connected to the outside secondary lead of the current transformer on leg B (this corresponds to the tail of the arrow, or negative lead) and to the inside secondary lead of the current transformer on leg A (this corresponds to the head of the arrow, or positive lead. Since

Current 3 = OC — OB, current to balance this, or Z = — OC + OB, and, therefore, secondary lead 3 is connected to the outside secondary lead of the current transformer on leg C (this corresponds to the tail of the arrow, or negative lead) and to the inside secondary lead of the current transformer on leg B (this corresponds to the head of the arrow, or positive lead).

Transformer differential connections may readily be checked by this comparatively simple vector method. The above detailed discussion and proof is given in order that the simple theory involved may be thoroughly understood. When this is accomplished, the application of this principle to the actual checking of connections on the job is quick, easy and accurate.

When connections have been checked and their correctness ascertained the relays should of course be connected into the circuit as shown at the right in Fig. 6.

**Wrong Connection.**

The question is often asked, "Why not star-connected current transformers on the star side of the power bank and delta-connected current transformers on the delta side of the power bank?" Such a connection is shown in Fig. 6. With this hook-up the differential relays would be caused to operate under many conditions of external or line troubles. For example, assume a single-phase failure, such as a flashover to ground, to occur out on the transmission line, or in fact anywhere outside of the section supposed to be under the protection of the differential scheme. Such a fault is indicated at "X" in Fig. 6. The short-circuit current in this case will be only single-phase. Thus the short-circuit current will flow through leg CC′ and cause secondary currents to flow as indicated by the arrows. All the short-circuit current delivered must come from and through legs A′ and C′. Therefore,

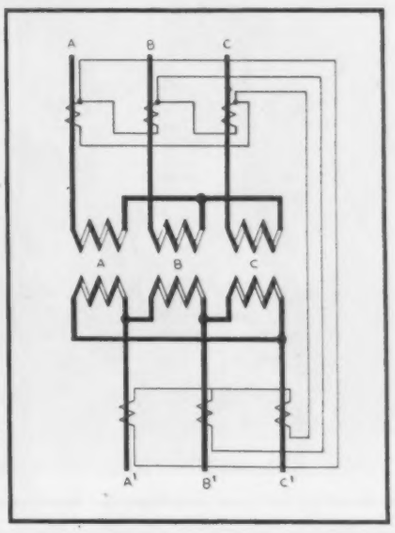



Fig. 4.—An alternate for the same condition shown in Fig. 3. Power transformers additive polarity.

Since the secondary current from the current transformer in leg A′ has no current from the current transformer in leg A to balance it, all of this current must return to the neutral through the differential relay, as shown by the arrow, and cause faulty operation. This condition is one which obviously proves out according to the simplest fundamental theory and has been proved experimentally by some users. Therefore, the scheme should not be used.

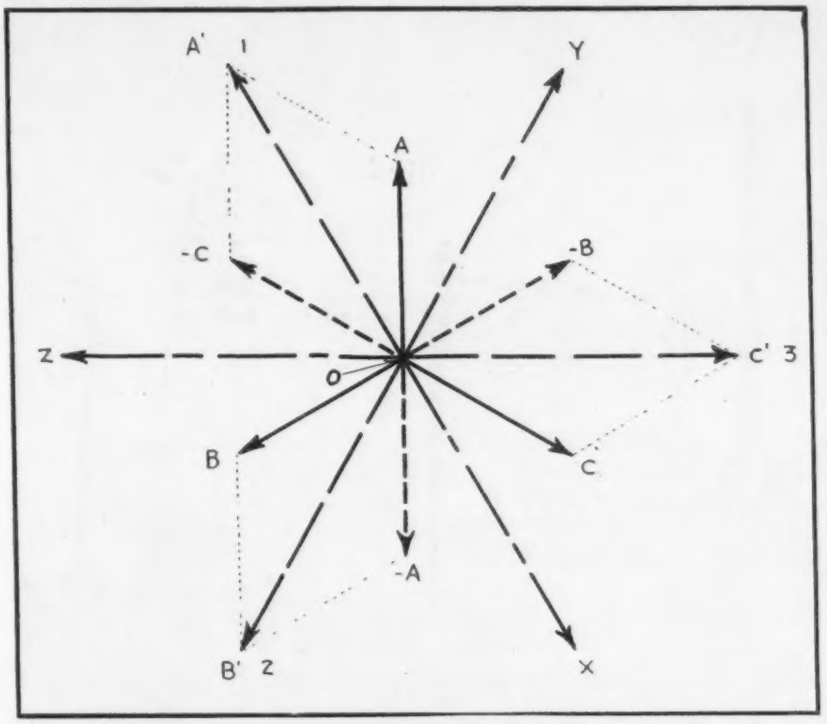



Fig. 5.—Simple vectorial proof that the secondary currents obtained with the connection scheme illustrated in Fig. 1 are of the proper physical relations to actuate protective relays for differential protection of a star-delta power transformer bank. The solid vectors represent the magnitude and relative directions of the currents within the current transformers on the star side of the power bank. The dashed vectors represent the magnitude and directions of the currents within the current transformers on the delta side of the power bank. The dotted vectors represent the "minus" or relatively reversed direction of the currents represented by the solid vectors. The dot-and-dash vectors represent the resultant current obtained by connecting each secondary lead from each current transformer on the star side of the power bank to a relatively opposite secondary terminal of an adjacent current transformer. These resultant secondary currents from the current transformers on the star side of the power bank are 180 deg. out of phase with the secondary currents from the current transformers in corresponding phases on the delta side of the power bank. This condition must exist when power is being delivered through the bank to insure the correct operation of differential relays under fault conditions.

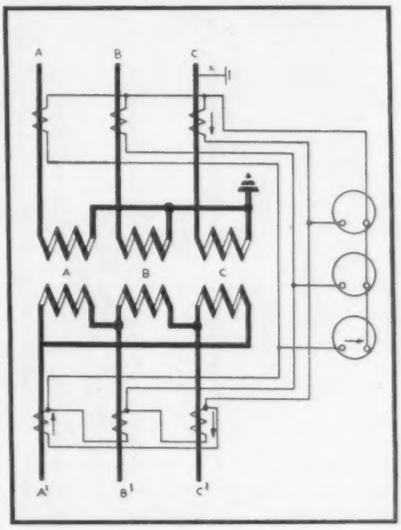
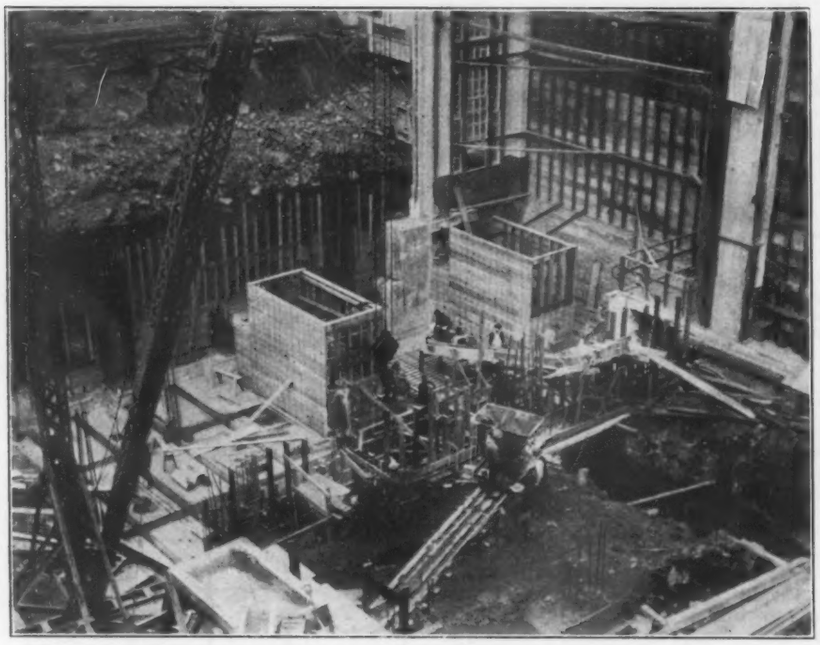



Fig. 6.—Showing the proper method of connecting relays into the secondary wiring for differential protection of a star-delta subtractive-polarity power transformer bank. The wiring diagram shows the current transformers connected in star on the star side of the power bank and in delta on the delta side. This scheme of connection is wrong because with it faulty operations of the relays will be caused when faults occur outside of the differential hook-up at any point such as that indicated by "X."

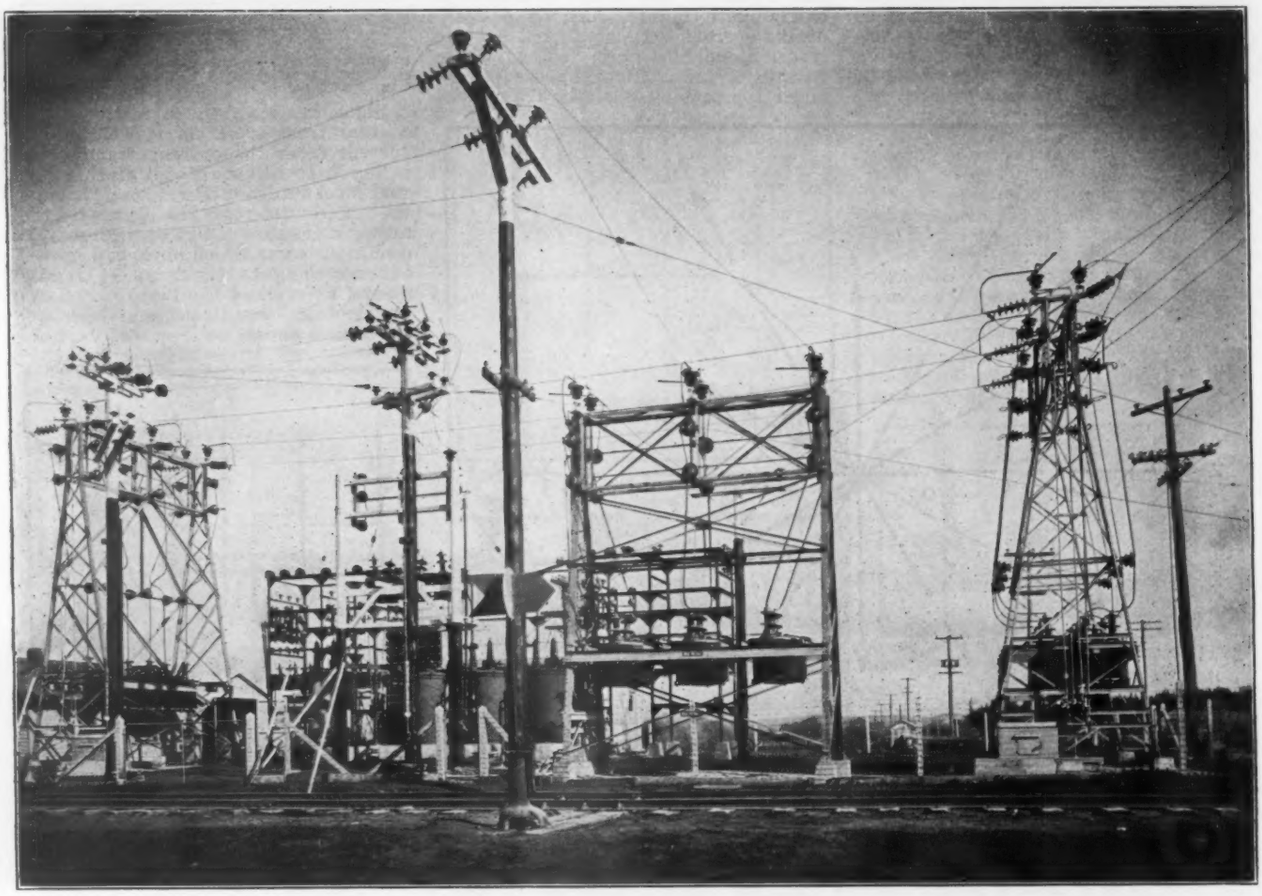


Construction work incident to extension of Big Creek No. 2 power house.

## Big Creek No. 2 Power House Being Extended 56 Ft.

A 56-ft. extension is being made at power house No. 2 on the Big Creek development of the Southern California Edison Company. The accompanying photograph was taken Dec. 15, 1924, and shows the progress of the work up to that date, when the job had been under way for only a short time. Prior to the starting of this extension the construction crew had been engaged in making a similar extension to the No. 1 power house. The major portion of the work at No. 1 was done first because it is at an elevation 2,000 ft. higher than No. 2 and the weather is consequently more rigorous.

The building is being extended down stream a distance of 56 ft. up to the fourth floor level. This additional space will accommodate a fourth 17,500-kw. generator. Twin impulse wheels will drive the new unit. The forms for the pits of these wheels are being built as shown in the accompanying illustration. Above the fourth-floor line it will be necessary to make only a 14-ft. extension as the additional bus and switching equipment takes up less room than the generating unit. This will complete the development of the present power house.



San Juan substation of the Pacific Gas and Electric Company. This sub has just been partially rebuilt and is typical of outlying stations of a like capacity where loads of importance and 60,000-volt transmission lines are involved. The station bank, shown in the background, is of 3,000-kva. capacity and feeds both a 22,000-volt bus and a 4,000-volt bus. The 60,000-volt bus is stretched between the towers at the right and left of the illustration. The two incoming lines are taps from the Port Marion-Salinas-Soledad lines and come in onto the bus one through the standard switching-tower unit at the extreme left and the other through the unit at the right center. The transformer primary leads are taken from the bus through the older wooden tower at the left center. An outgoing 60,000-volt line to the plant of the Mission Cement Company takes off from the switching unit at the extreme right. It will be noted that current transformers are included on this switching unit. All 60,000-volt lines are protected by directional overload relays. The structure carrying the low tension buses may be seen in the background. The oil circuit breakers are manufactured by the company at its Sacramento shops. The oil-filled current transformers are also made by the company. The tower steel is supplied by the Pacific Coast Steel Company according to specifications made up by the Pacific Gas and Electric Company.

# Fireproof Bungalow Built for Dispatcher's Office

## Single-Story Building Designed for the Purpose Provides Separate Office for the Dispatcher's Force

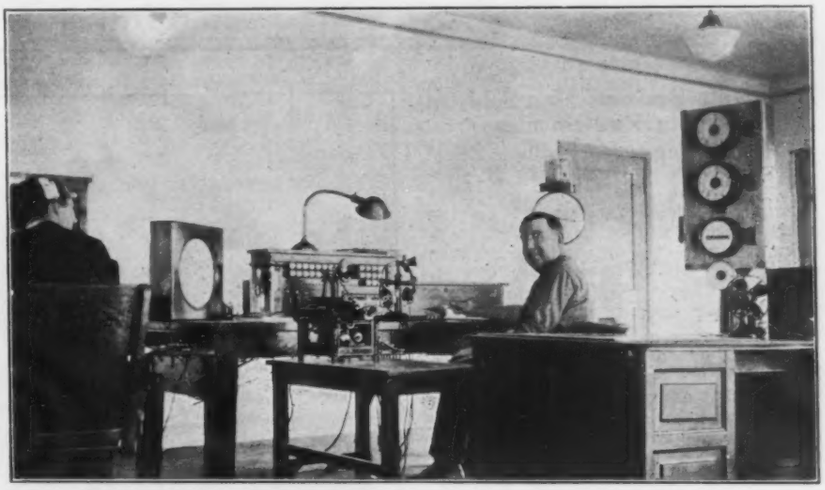
A separate distinctive building of the bungalow type now houses the dispatcher at Terminal, Utah, on the lines of the Utah Power & Light Company. The building is comparatively fireproof, being constructed of hollow tile overlaid with stucco on the exterior and plaster on the interior. A Johns-Manville composition shingle roof and brick trimmings around the steel casement windows add to the durability and appearance of the structure. The main floor consists of a main operating room, a vault, a workroom and a telephone-line entrance room. A full basement underlies the whole main floor.

Efficiency of the dispatching force has been increased by the new building because of its modern equipment and the fact that it is far quieter than the old quarters on the third floor of the Terminal substation. Shadowless illumination is available over the entire operating room as the five 150-watt Trojan lighting units are so spaced as to distribute the light evenly.

Heat is supplied through a hot-water circulating system of the latest design. An even temperature of any desired degree may be maintained through a thermostat heat regulator.

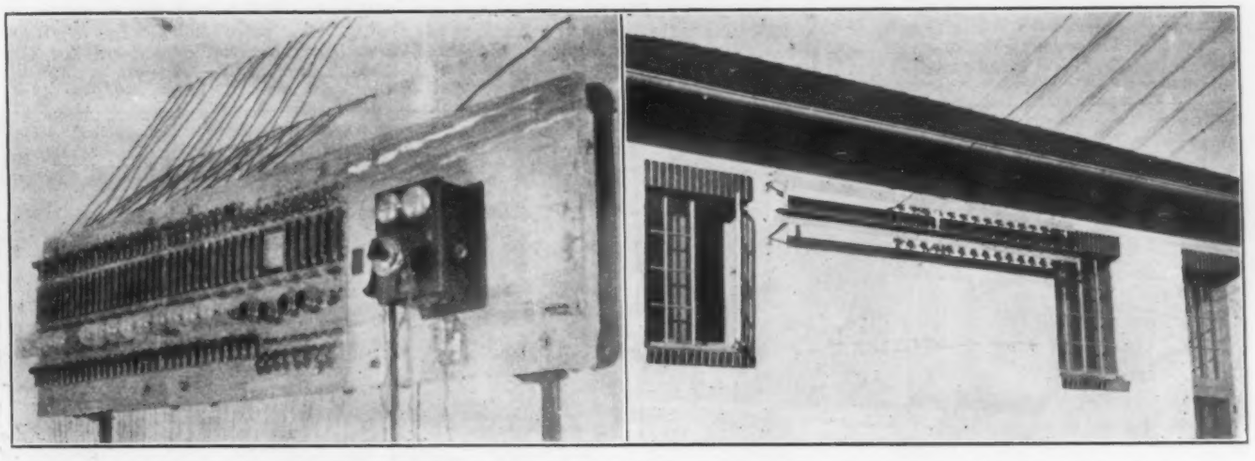
Open wiring is used exclusively in bringing the telephone lines in to the dispatcher's desk. The lines are so arranged that it is particularly easy to trace any trouble that might occur. No conduit or concealed work is used in the building in connection with the telephone equipment. It is believed by those responsible for this design that the open wiring system will materially help toward eliminating cases of trouble on the dispatcher's lines of communication within the building.

Windows are so arranged that a generous supply of light and fresh air is always available. Steel casement windows were used because they blend better with the building design and because they give more efficient ventilation for a given wall opening than do the more common sash. Ample storage room is provided in the storeroom and in the two vaults to take care of the operating records and files kept at the dispatcher's office. Filing cabinets, maps and similar equipment can be arranged conveniently and readily accessible in the operating room. Wall space provides plenty of room for the mounting of such system maps as are commonly referred to during dispatching operations. The dimensions of the operating room are sufficient to permit the dispatchers plenty of elbow room. The new office is neat and attractive in appearance both inside and outside.



Dispatcher Mueller at the new nerve center of the Utah Power & Light system at Terminal, Utah.

Exterior view of new hollow-tile, stucco-finish dispatching building of the Utah Power & Light Company at Terminal, Utah.



Arrester and main fuse board (left) and entrance rack (right) on the telephone lines entering the office of the dispatcher of the Utah Power & Light system at Terminal, Utah. Note the open wiring. No conduit is used on the telephone lines anywhere in the building.

# IDEAS FOR THE CONTRACTOR

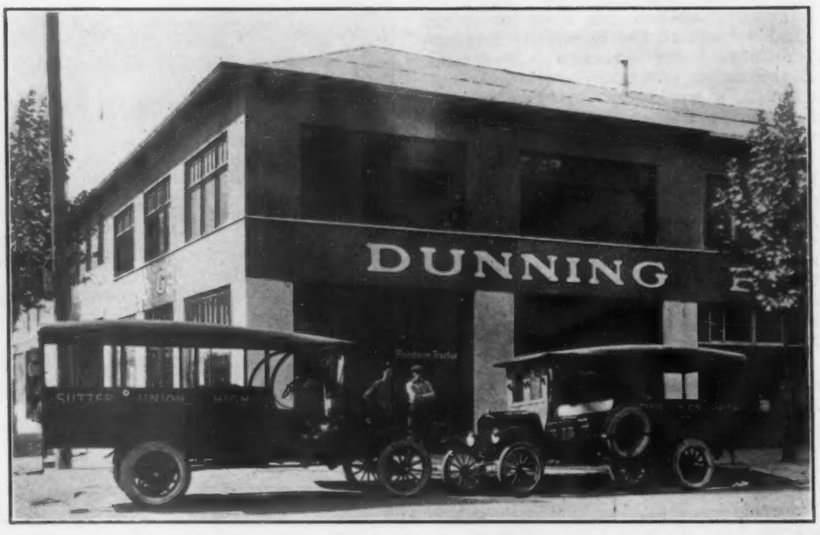
## Marysville Business Man Sold On Complete Electrification

H. H. Dunning of Marysville is a firm believer in the universal use of electricity. He is now having a former garage remodeled into stores on the ground floor and fourteen two-room apartments on the upper floor. These apartments will be completely electrified, each having an electric range, water heater and air heater.

Mr. Dunning has recently completed a spacious garage in Marysville, where he has 60 employees. This garage has a completely equipped electrical kitchen where the noonday meal of the employees is prepared. Good wholesome food is served and the amount is unlimited, yet this meal costs the employees only twenty-five cents.

This is a new field for the installation of electrical equipment and offers an opportunity for the electrical contractor that should be developed.

LeRoy H. Crandall of the California Electrical Bureau was partly responsible for selling Mr. Dunning the "completely electrical" idea.




Garage of H. H. Dunning, Marysville, which is being remodeled into stores and fully electrified apartments. Mr. Dunning's new garage, recently completed, has an electrical kitchen for preparing the noonday meal of his employees

## Electrically Heated Fire Houses New Field for Contractors

Two fire engine houses recently completed in Sacramento were completely equipped with electric air heaters. These buildings house the apparatus and provide living quarters for the members of the department. The air heaters are used to keep the apparatus warm so that it starts easily at all times, as well as to provide heat in the living quarters.

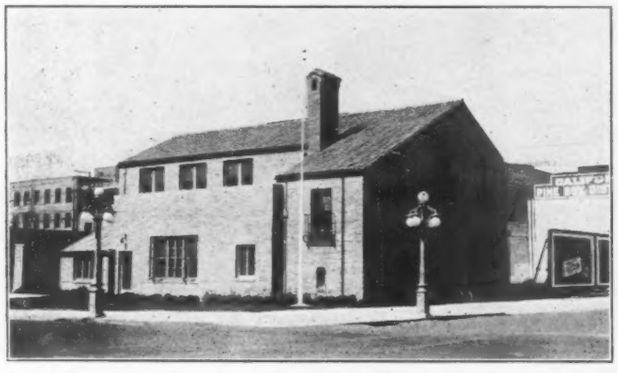
One of these modern engine houses is located at 43rd and J Streets in the residential district. The architecture of the building was made to conform to the architecture of the surrounding homes, and the accompanying picture shows how well this was done. This house is equipped with Wesix flush-type air heaters, there being one 2-kw., four 2½-kw., five 3-kw. and two 4-kw. heaters. Dean & Dean were the architects, and the electrical work was installed by Latourrette-Fical Company.

The other house is at 2nd and L Streets and is equipped similarly. Dean & Dean were the architects, and the electrical construction was by the California Mechanical & Electrical Engineering Company.

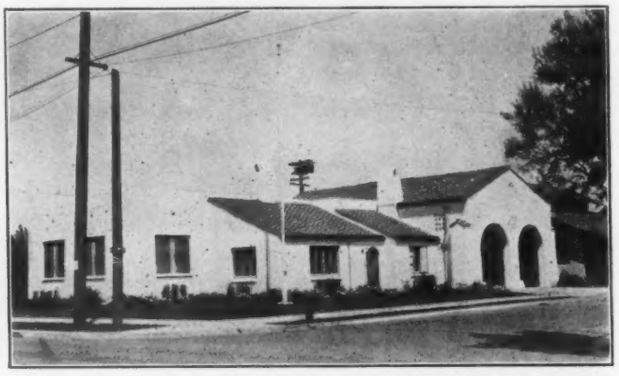
**W. W. Mohrdick,** formerly of the Mohrdick-Foran Electric Company at 1803 Castro Street, San Francisco, has recently established the Mohrdick Electric Company at 2258 Market Street, in that city. Mr. Mohrdick has also become a member of the San Francisco Association of Electrical Contractors and Dealers. He has been a member of the California Electragists for some time.

## Electrolier System Financed by New Method

A novel and unique method of financing the installation of electroliers in Marysville, Calif., has been devised by the property owners in that they are paying approximately $1.50 per front ft. for the electrolier installation. In this way it was not necessary for the city to bond itself and sell the bonds, which will tend to reduce the total cost to the people. Fifty 400-watt Novalux electroliers with No. 1034 type standard will be installed, using a crystal glass shade. Four electroliers will be installed on each side of the street. This will be the first installation in the state using this electrolier. George W. Roberts has the electric contract for the installation.



Electrically heated fire engine house at 2nd and L Streets, Sacramento



Residential type of fire engine house at 43rd and J Streets, Sacramento.

# Electrical Trade Associations Should Be Supported

## Leaders Plan Constructively for Betterment of Conditions Within the Entire Industry

BY C. B. KENNEY
Manager NePage, McKenny Company, San Francisco

An analysis of the management personnel of electrical - contractor - dealer organizations shows that, in the main, the executives have risen from the ranks of apprentices and journeymen. Many of these men have worked up through various positions as estimators, superintendents and so on, before finally branching out into business for themselves. Doubtless this is equally true in other mechanical lines, and it seems the natural and proper course of individual advancement. This individual initiative and desire for advancement should be fostered and encouraged by those who have already established themselves in the commercial world. As an aid to the individual who is ambitious and to the concern that is desirous of proceeding along constructive lines, various trade associations have been formed and are functioning as guides in the establishment of business conduct. Almost without exception these associations are headed by men of experience and stability who are thinking and planning constructively for the betterment of conditions within the entire trade. For that reason as well as for individual advantage, trade associations should be staunchly and loyally supported.

This is particularly true in the electrical business where, on account of the great variety in classes of construction, ranging from repair work and very small jobs to the largest and most complex installation, the field is open to many of widely diversified experience. The small amount of capital needed for a start in electrical contracting and the very open supply market tempts many men to start out for themselves without a proper foundation in their trade and without financial training. For such men the trade association is most certainly a bulwark. This fact, however, is all too often not recognized and the small contractor-dealer, the man who has the most to gain from trade associations, is frequently the last to appreciate association advantages. Possibly these smaller firms are sometimes intimidated by the close association with the larger competitve organizations, but inasmuch as the basis of all trade organizations is mutual trust and confidence, this feeling must be entirely eliminated. It seems that it must indeed be a low type of individual who will break bread with a competitor and then be guilty of unethical trade practices. The larger firm has no need to fear the smaller, and the smaller should not permit itself to fear the larger, as the classes of work performed by the two organizations normally vary so widely in scope that there is no point of contact. The smaller concern is busied with house wiring, repair jobs and the various smaller contracts, while the larger firm engages itself almost entirely on the larger contracts which involve too heavy a financial outlay and hazard even to attract the smaller concern.

While it is commendable that journeymen should desire to work themselves into the position of master contractors and electrical contractor-dealers, it is nevertheless regrettable that most of these journeymen, when they finally do branch into the contracting business for themselves, do so absolutely without any adequate foundation, experience or knowledge of business methods. This applies not only to contracting but also to merchandising. The serious results of this evolutionary process are written in the figures relative to the mortality of electrical contractor-dealers. A detailed study of the major cities of the Pacific Coast shows that over 90 per cent of those who start in the electrical contractor-dealer business fail to remain in business for five years or longer. Of the remaining 10 per cent the majority by far are those who have had training or experience in merchandising and in the general conduct of business. While it is undoubtedly true that there are many occasions when men are justified in becoming master contractors prior to the time when they have had the experience that this business occasions, it is nevertheless true also that such men must look elsewhere than within themselves to supply the deficiencies of their own experience.

It is on just this fact that the various associations of electrical contractors and dealers base their existence. The entire thought of such associations is constructive in its nature. No intelligently guided association is proceeding along the basis of price control, for not alone is this unlawful but it is unsound economically. Fortunately, the various contractor-dealer associations of the West today, and particularly of California, number as their executives some of the keenest minds in the contracting branch of the industry. These association executives are devoting much of their time and no small amounts of money to the upbuilding of the association to the end that all of the members alike may enjoy the benefits that come from unity. Many of these benefits are founded on the rich experience of men who have spent years in contractor-dealer activities. The president of one of these associations is a man who has been conspicuously successful and who started in as an apprentice, working up through various stages of journeyman, foreman and superintendent, to the time when he owned his own business. His success has been due entirely to the fact that he followed out good business ethics. He has acquired a considerable competence, and is devoting a large share of his time to the activities of his association. In addition to this, very frequently and without publicity, he makes it possible for some smaller members to secure a contract that by virtue of circumstances naturally would gravitate to his larger firm.

Every member of the electrical business should have a deep-seated interest in trade associations, particularly in those associations which have to do with the contractor-dealer branch of the business. The contractor-dealer seems to be the keystone of the arch, and should this member fail, conditions would certainly be most chaotic. The cause of most of the failures in the contractor-dealer branch of the industry is indicated by the more than ninety per cent mortality rate in less than five years. As only ten per cent of those who start in the contracting business are able to weather the storm for five years or more, it becomes apparent that a condition exists that should command the interest and attention of every member of the electrical industry. Manufacturers, jobbers, central station employees, salesmen, managers, executives of all kinds, alike should interest themselves in contractor-dealer activities, and should participate as largely as occasion affords in the activities of such associations. Every effort should be made to eliminate sharp practices, unethical conduct and the many pitfalls that are placed in the way of legitimate business by those who would be guilty of unfair competition. Participation by manufacturers, jobbers and others also will benefit the contractor-dealer on account of the contacts that will follow and on account of the better understanding that can be established between the source of material supply and the source of material outlet. Closer cooperation between these two cannot but result to the mutual advantage of both.

One of the prime requisites for the successful conduct of any business is proper accounting. This has been one of the greatest weaknesses of the average contractor-dealer, and the failure to recognize the need for accurate financial records has been the cause of failure of a high percentage of the contractor-dealers who have not succeeded. Trade associations generally are sponsoring accounting systems that apply particularly to the electrical business and more particularly to the contracting branch of the business, and such jobbers, manufacturers and major trade associations have devoted special attention to this feature. Some of the more progressive jobbers have taken radical steps along this line and have assisted dealers in installing the accounting method that would be most beneficial. Various trade magazines have given their support to this movement at considerable expense, and devoted much of their space to constructive material for the benefit of the contractor-dealer. Central stations generally are glad to participate in these trade-association activities.

Since it is absolutely necessary to have some general channel for the installation of wiring materials that makes it possible to apply the various electrical devices manufactured, and since this channel has been definitely established as the contractor-dealer, it becomes immediately apparent that it is incumbent upon the entire electrical industry to lend its fullest support to this particular branch. Everything that can be done should be done to improve the status of the contractor-dealer, and to assist him in proper merchandising methods and in the establishment and maintenance of ethical practices.

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**The Wilshire-Beverly Electric Company** was recently opened at 1727 Wilshire Boulevard, Beverly Hills, Calif., by F. W. Redfield, formerly of the Sani High Electric Company, R. T. Redfield, formerly of the Illinois Electric Company, and F. A. Griessen. The firm will specialize in the manufacture and installation of high-grade lighting fixtures.

# Model Plant an Aid in Industrial Electric Field

## Pacific Electric Motor Company Occupies Building Embodying Many Suggestions for Men Interested in Electrical Shop Practice

One of the latest developments of importance in the industrial electric field on the eastern side of San Francisco Bay is the new building of the Pacific Electric Motor Company, at Tenth and Oak Streets in Oakland. It is noteworthy because it enables that concern efficiently to broaden and thoroughly round out its activities and facilities for the complete electrical service of industrial organizations in the immediate community and in interior districts.

In the electromotive field the Pacific Electric Motor Company is in position to specify and supply any motors, controls and attendant apparatus that may be needed, including wiring, transformer installations and switchboards. Where stock parts are not suitable, it will design special apparatus and switchboards, as well as plan the development of special equipment for unusual jobs. Work of this character varies from installations for rolling mills and bascule bridges to single motors in small shops.

The industrial lighting activities of the company are similarly broad in scope. All phases of lighting installations are handled—fixtures, sizes, locations, heights and shadows. Specifications provide for the best use of materials in such ways as splitting up circuits and running high-voltage wires to transformers located near the point where the lights are to be installed. The advantages of flood lighting and special lighting on machines are considered for each individual case.

Personnel for handling this work is divided into administrative and engineering departments, in the latter being grouped the installation, shop, service, stock and shipping men.

Every phase of the plant equipment was given thorough and careful attention in the planning stage. Generous room was provided for the office, an estimating and planning room, shop, stock room with crane and steel shelving, and a well lighted sales room in which the full stock of motors and controls is displayed, together with a display of pulleys and other equipment carried.

Routing of work through the shop is given special attention in order that each step might be progressive and efficient. A description of the layout of the shop and the machines in use should be full of suggestions for every man interested in electrical shop practice.

An entrance for trucks leads directly to the stock-room office and under the runway of the 10-ton electric crane which is operated over a 100-ft. track serving the machine, assembly and disassembly sections as well as trucks and the motor salesroom. At this stock room the jobs are recorded and tagged as they come in, and the work orders for the shop are at the same time made out. New apparatus arrives by the same route and is checked into the sales room or out to installations that are under way, while stock parts and pulleys are segregated to the proper places in one of the twenty stacks of steel shelving and bins. Apparatus to be repaired is delivered to the shop assembly and disassembly section, which is adjacent to testing and cleaning apparatus and equipped with low steel tables and a 50-ton press.

Thorough testing is the first step in order for incoming jobs, of course, and for this reason the test board is located at the front of the shop. It is fitted with apparatus to test for grounds, shorts, opens and all other faults or defects, and when completed it will be the most complete installation of its kind west of Chicago.

The transformer room is situated directly above the test board, and through the floor an opening has been provided for running conduits and wires to the test board and distribution center. This transformer room is a fireproof vault, and in it are housed the main service oil switches and contactors, transformers, resistors and special apparatus. A special room is provided for generators, compressors and heating apparatus.

In a separate fireproof room in the same section as the transformer room are the dipping tanks which are served with a hoist and handling equipment. Adjoining is the oven provided with steel car and rack for carrying coils, stators and such articles.

Returning again to the progress of a job as it comes into the shop, it is seen that, following the testing, provision has been made for any sort of handling which may be necessary. The 10-ton electric traveling crane will place the job in the required position where any necessary stripping of gears, bearings, pulleys and so on may be done easily with the 50-ton press.

Following disassembly, the parts to be worked on at once go to the cleaning room while the balance of the job is sent to the holding section where a bench with sliding drawers is fitted up for keeping small parts segregated and in order. The cleaning room is of special, fireproof construction and is equipped with hoist, distillate tank and force pump, compressed air and an exhaust fan to carry off the fumes and dust.

When thoroughly cleaned, the jobs are sent directly to either the machine department or the winding department.

The machine department is equipped with two medium lathes and one 25-in. LeBlond. To the latter a compound head is to be added to increase the swing to 60-in. Grinding and buffing wheels, drill presses, power hack saws, shaper, milling machine and similar equipment are conveniently placed. All machines have direct drive by variable speed, d. c. motors and automatic push-button control.

Special heavy steel tables with built-in furnaces and heavy vise are used for babbiting. The furnace is supplied with gas and compressed air, and there is also a gas and compressed air torch. Bearings of any size may be cast, and all are bored to accurate dimensions. Special attention is given to securing proper grooves for oil, and bearings are made without blow holes and turned so that they are free from chatter marks. Provision is being made for reaming and burnishing bearings to absolutely accurate gage.

Throughout the shop, facilities are provided or planned for any class of machine work. Working conditions are pleasant; the lighting ideal by night as well as by day, and the work benches are heavy and wide with ample drawers sliding smoothly on steel guides, a drawer with lock for each man.

The winding department is equipped with insulation cutters, armature horses, low steel tables for heavy work and rotating tables for smaller jobs. The work benches are of 3-in. stock with Hallowell steel bench legs similar to those in the machine section. Each winding position carries a simple test set which is set flush with the backboard of the bench. Each main bench carries an auxiliary test panel for the heavier testing currents, both direct and alternating current. All positions are provided with compressed air and gas, and there is a gas stove for each two positions. A rolling crane serves the winding department together with a compressed air hoist for stripping old windings from stators.

Adjacent to the oven and dipping room and occupying one corner of the winding department is the coil winding section. Machines are here installed for winding, shaping and taping coils. Great care is taken to keep the benches in this section free at all times from dirt and all apparatus other than the coils being made. One bench is fitted wit hsteel racks for hanging coils and with foot-controlled vises for clamping them while taping. By locating this section close to the oven and dipping room the progressive scheme for handling jobs is followed out.

A special machine is being designed for winding the smallest or largest coils at very low or very high speeds up to 2,000 r.p.m. At these high speeds dynamic breaking is provided to stop the reels properly. It synchronizes the reels automatically so that they stop with the revolving head. A later article will deal with this machine in detail.

After the winding has been completed, the stator or arm is sent to the oven where it is thoroughly baked out before impregnating. Then, while hot, it is picked up by an overhead traveling hoist from the oven steel dolly and dipped in a thick, heavy insulating varnish of the highest quality. It is then drained, returned to the oven and rebaked. This produces a job which is highly resistant to oil, water and other foreign matter.

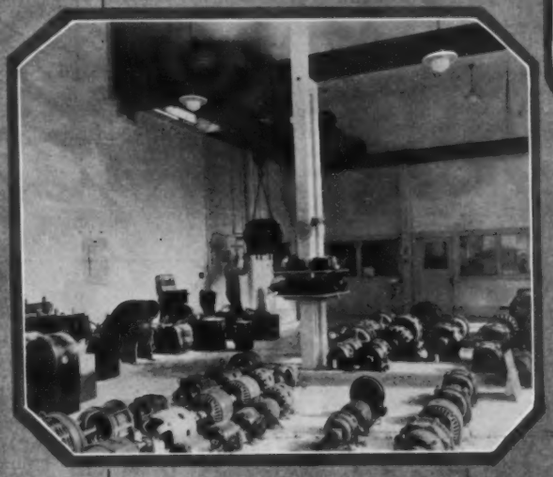
Thorough tests are made at this point and again after assembly of the motor or apparatus. The rule applied for breakdown tests is to double the operating voltage plus 1,000 volts. A record is kept of no-load exciting current, leakage, heating and other factors.

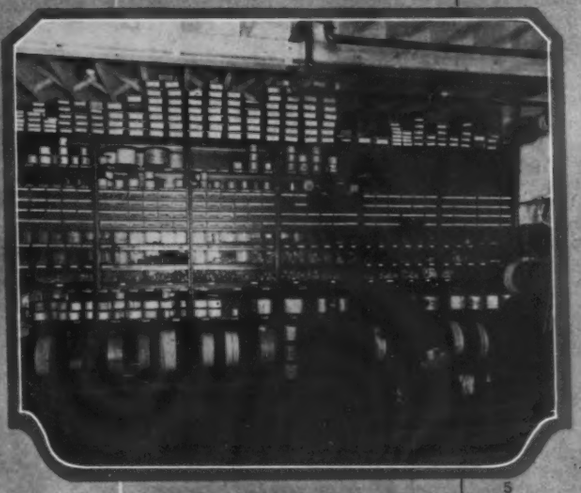
When a job is completed and checked with the inspector's approval it is returned to the shipping department where the records are completed and delivery made to the customer or to the shop service men who are making the installation.

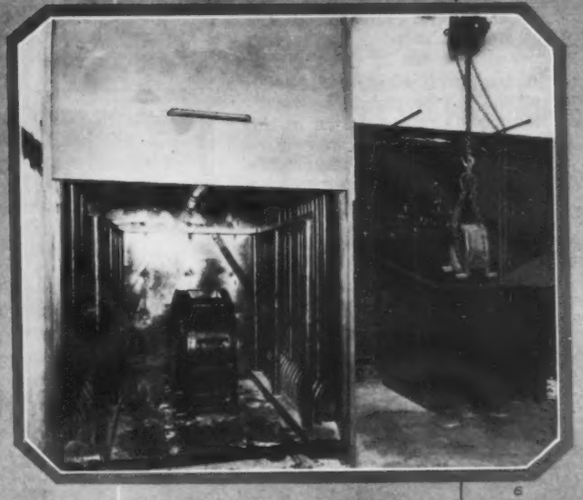
Delay is avoided in winding any type of motor or apparatus by carrying a complete stock of magnet wire. In fact, the company carries a heavy investment in stock of all kinds in order that work at all times may be expedited, and details in the stock room therefore were worked out carefully.

The stock room is equipped with 300 steel boxes for small parts, and for larger material there are twenty stacks of steel shelving.

THE modern plant of the Pacific Electric Motor Company in Oakland is a model to be followed in electric shop practice. The illustrations show interesting parts of the shop. (1) The 10-ton electric crane for moving motors; (2) rear of shop showing steel work benches; (3) machine department with lathes; (4) exterior; (5) stock shelves and drawers which are of steel; and (6) oven and the dipping room.







# BETTER MERCHANDISING

## Do Electrical Men Practice What They Preach?

### San Diego Club Conducts Contest to Determine Number of Men Really Qualified to Sell "Electrify" Idea.

To prove to itself that its members were not "bald-headed barbers" nor "bare-footed shoemakers." The San Diego Electric Club inaugurated an "Electrify" contest designed to give an index of the relative electrification of the homes of those belonging to the club. The opinion of the leaders in the movement was that no man who did not believe in what he attempted to sell could make a success of placing his material in the hands of the buying public.

For three or four years all electric clubs and leagues have advocated, and built for demonstration, electric homes. Then it occurred to someone to inquire just how many really electric homes there were to be found among the homes of the men of the electrical industry itself.

Inspired by an "Electrify" campaign put on by an Eastern electric league, P. P. Pine, power sales engineer for the San Diego Consolidated Gas & Electric Company, and two years ago secretary-treasurer of the San Diego Electric Club, sought support of the idea to bring this matter to the attention of the club. He was assigned the meeting of March 3 to put over the "Electrify" idea, and the plans and arrangements he made promised an unusual meeting and after-effects for the San Diego club. The cooperation and enthusiasm he aroused by the idea suggest that other electric clubs might find in the idea similar response and good results.

To set a standard whereby a home might or might not be considered electrified, a questionnaire, as shown in the accompanying illustration, was prepared. On it were listed all the possible electrical conveniences of a home, with ratings given each appliance or outlet according to its relative importance or wattage. The points were totaled at the bottom of the sheet and the score determined.

Seventy-five was set as the minimum number of points a home should have to be considered electrical. The questionnaire was sent out to all members of the club, both resident and non-resident, with an urgent request, accompanied by stamped and addressed envelope, for the return of the questionnaire filled out completely.

Prizes for the contest were provided by a number of appliance concerns. The first prize, a complete percolator set, was donated by the power company; the second prize, a floor lamp, by the Southern Electrical Company; the third, a pancake-waffle iron, by Electric Supplies Distributing Company; and fourth prize, a fan, by the General Electric Company.

But completely electrical home-owners were not to be the only prize winners, according to the plans made by the "Electrify" committee. Two consolation prizes were awarded the two lowest scores. The winner of the first consolation prize received a turnover toaster, given by the Westinghouse Electric & Manufacturing Company, and the second was given a tumbler water heater by the Illinois Electric Company.

A special prize, a percolator donated by the Edison Electric Appliance Company, was offered as an inducement for non-resident members and guests who entered the contest. Another special prize, designed to draw into the contest those members of the club not from central-station, contractor, dealer or jobber organizations was offered to members from the telephone and street railway companies.

The rules of the contest, given on the questionnaire sent out by the San Diego Electric Club, were as follows:

? DO YOU PRACTICE WHAT YOU PREACH ?

Fill in this form and see if your own home entitles you to membership in the SAN DIEGO

*Lots of Prizes* **Electrify Club** *Consolation Prizes Too*

OF ELECTRICAL MEN WHO ACTUALLY HAVE ELECTRIC CONVENIENCE IN THEIR HOMES

HERE'S THE LOW DOWN ON THIS QUESTIONAIRE

**What Wiring and Outlets Have You?** Take the table below, or any other table such as is used for figuring wiring jobs.

Opposite each room put down the outlets in that room. The first column is, as labeled, for ceiling outlets. An outlet means "where the wire comes through the ceiling," and each outlet counts one, even if it supplies a 2-socket or a 5-socket fixture. A drop light would come under this head the same as a chandelier outlet.

The second column is the space for side wall or bracket outlets. Each bracket outlet counts one even if there are two sockets on the bracket.

The last column is for "convenience outlets" or receptacles. Switches are not considered as separate outlets. A duplex convenience outlet counts 2 points. Multiple screw-in plugs, however, are not counted.

In the table below, the rooms shown in heavy type are those that count in designating its size, in real estate terms; viz., kitchen, living room, dining room, laundry, bedrooms, etc.

Having put down all the outlets you have wired up, then add together the ceiling outlets, the bracket outlets, and the convenience outlets (switches not being considered as outlets), and get the total.

Then count up the number of rooms in your house on "the real estate" rating of principal rooms. (See heavy type in table).

Divide the number of outlets by the number of rooms and multiply by ten, and that gives you the number of points to be credited for your wiring.

**Figuring Up Your Appliances**

In the spaces below will also be found lists of appliances of various sizes. Opposite each put the number that you have, and set down the proper number of points earned.

Add up the grand total of points for both wiring and appliances, and you have your rating "in points", for The Electrify Club.

SEVENTY-FIVE POINTS WILL QUALIFY YOU TO MEMBERSHIP IN THE CLUB

Fill out this Questionaire. Sign it and mail in Enclosed Stamped Envelope.

**How to Count Your Wiring Outlets**

| Room | Ceiling Outlets | Bracket Outlets | Convenience Outlets | Example |
|---|---|---|---|---|
| Kitchen | 2 | 2 | 10 | |
| Parlor | | 3 | 7 | |
| Dining Room | 1 | | 3 | |
| Laundry | 5 | 2 | 5 | |
| Bedroom | 1 | 1 | 4 | |
| " " | 1 | 1 | | |
| " " | 2 | 1 | 6 | |
| " " | | 1 | | |
| " " | | | | |
| " " | | | | |
| Bath Rooms | 2 | 1 | 1 | |
| Closets | | | | |
| Porches | 2 | | | |
| Halls | 3 | 1 | | |
| Totals | 19 | 13 | 36 | |
| Grand Total of All Outlets | | | 68 | |
| Number of Rooms, 8. | | | | |
| Number of Outlets divided by number of rooms and result multiplied by 10 = 68 ÷ 8 × 10 = 85. | | | | 85 |

**For the following small appliances count one point each—not more than two of same thing to count:**

| | | |
|---|---|---|
| Buffer and grinding set | 1 | |
| Christmas tree sets | 2 | |
| Cigar lighter | | |
| Coffee grinder | 1 | |
| Curling iron | 1 | |
| Egg mixer | 1 | |
| Electric fans | 2 | |
| Electric phonograph motor | 1 | |
| Electric player-piano | | |
| Hair dryer | 1 | |
| Heating pad | 2 | |
| Sewing machine motor | 1 | |
| Soldering iron | | |
| Electric clocks | 2 | |
| Radio | 1 | |
| Vibrator | 1 | |
| Violet-ray machine | | |
| Hand drill | 1 | |
| Hand vacuum cleaner | 1 | |
| Furnace control (thermostat) | 1 | |
| Motor driven air pump | | |
| Electric gas lighter | 1 | |
| Toy clothes washer | 1 | |
| Toy electric range | 1 | |
| Electric mousetrap | 1 | |
| Points | 24 | 24 |

There may also be included in the above any appliance taking less than 300 watts that is not included in this or the other lists.

**For 660-Watt Devices Count Two Points Each**

The following appliances count two points each, but as before, not more than two of any one kind may be counted.

| | | |
|---|---|---|
| Chafing dishes | | |
| Egg boilers | | |
| Grills | 2 | |
| Immersion heaters | 4 | |
| Milk warmers | | |
| Percolators | 2 | |
| Plate warmers | | |
| Pressure cookers | | |
| Samovars | | |
| Shaving mugs | | |
| Toasters | 2 | |
| Waffle irons | 4 | |
| Points | 14 | 14 |

Include in the above any other appliance taking over 300 watts, but not over 660 watts.

**Electric Irons and Radiators, Two Points Each**

The following count two points each, but as many as three of each may be counted:

| | | |
|---|---|---|
| Flat irons | 6 | |
| Radiators of the "sunbeam" type that are plugged in on convenience outlets | 2 | |
| | 8 | 8 |

**Count Portable Lamps One Point for Each Socket**

The following count according to size:

| | | |
|---|---|---|
| Portable or Table Lamps, Count one point for each socket | 25 | 25 |
| Electrically wired furniture, such as wired beds or tables | | |
| Count one for each socket or convenience outlet. | | |

**Devices Rating at Five and Ten Points Each**

The following count five points each, but only one may be counted:

| | | |
|---|---|---|
| Electric ice-cream freezer | 5 | |
| Electric fireless cooker | | |
| Also, any electric appliance not included in the lists that takes over 660 watts and therefore has a special circuit | 5 | |

The following count 10 points each, but no more than one of each may be counted:

| | | |
|---|---|---|
| Washing machine | 10 | |
| Vacuum cleaner | 10 | |
| Dish washer | 10 | |
| Mangle with electric motor, but not electrically heated | | |
| Electric water heater (1,000 to 2,500 watts) | | 40 |

**Heavy Consuming Appliances—20 Points**

The following count 20 points each, but not more than one of each may be counted:

| | | |
|---|---|---|
| Electric range of over 1,000 watts | 20 | |
| Electric refrigerator | 20 | |
| Electric mangle with electric motor and electric heat | 20 | |
| | 60 | 60 |
| Electric water heater (over 2,500 watts) | | |
| Charging plug for electric automobile. | | |
| Total points available for rating in The Electrify Club | | 256 |

(Please mail to Wm. Cyr, San Diego Cons. Gas & Elec. Co., San Diego)

Dear Bill:—Here's my rating, .....points, and here's hoping for either a prize or, by gosh, a consoler.

Name .....

Company .....

Home Address .....

Questionnaire sent out by the San Diego Electric Club in the "Electrify" contest.

**Wiring and Outlets**

Take the table below, or any other table such as is used for figuring wiring jobs.

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In the table below, the rooms shown in heavy type are those that count in designating its size, in real estate terms, viz., kitchen, living room, dining room, laundry, bedrooms, etc.

Having put down all the outlets you have wired up, then add together the ceiling outlets, the bracket outlets, and the convenience outlets (switches not being considered as outlets), and get the total.

Then count up the number of rooms in your house on "the real estate" rating of principal rooms. (See heavy type in table.)

Divide the number of outlets by the number of rooms and multiply by ten, and that gives you the number of points to be credited for your wiring.

**Figuring Up Your Appliances.**

In the space below will also be found lists of appliances of various sizes. Opposite each put the number that you have, and set down the proper number of points earned.

Add up the grand total of points for both wiring and appliances, and you have your rating "in points," for the "Electrify" Club.

Winners of the "Electrify" awards at the San Diego Electric Club meeting. Left to right—Carl Heilbron, winner of third prize; John L. Bacon, mayor of the city of San Diego, who won the non-dealer-power company prize; Boyce Jones, winner of second consolation prize; J. F. Munro, who scored highest in the entire contest; and Percy Adams, whose score was the lowest. The lamp in the center, as second prize, was won by A. E. Holloway, and the fan, as the fourth prize, by H. R. Peckham. Neither was present at the awarding of the prizes.

Those who could show that their homes rated 75 points were entitled to membership in the "Electrify Club." The total points available for rating in the "Electrify Club" were 256, and the winner of the San Diego contest scored a total of 208 points.

Interest in the contest was aroused through the sending out of the questionnaires and by means of the weekly announcements of the club. This announcement told of the contest that was to be decided at the March 3 meeting of the Electric Club and named the eight prizes that were to be awarded the winners.

In addition to the awarding of the prizes, the meeting was addressed by P. H. Booth, district manager of the Edison Electric Appliance Company, Ontario, who spoke on the "Electrification of the Home." Prizes were awarded by W. F. Raber, general manager of the San Diego Consolidated Gas & Electric Company.

The first prize for resident members was won by J. F. Munro, whose new home in San Diego had a rating of 208 points. A. E. Holloway, with a score of 175, took second prize for resident members, and Carl Heilbron won third prize with a rating of 151. Fourth prize went to H. R. Peckham, whose home scored 145 points. Consolation prizes were awarded to Percy Adams, whose score came to 33.3, and to Boyce Jones with a score of 34.5.

The prize for non-resident members went to F. J. Arey of Los Angeles. Mr. Arey's home had a rating of 205. Mayor Bacon won the special prize for members of the club not belonging to the organizations of the central station, contractors, dealers or jobbers.

Favors consisting of frosted lamps were given to each guest at the meeting. Fines levied during the meeting were collected in electrical units. Credit for the success of the "Electrify" program was given to P. P. Pine by Herbert Rose, president of the club.

## Abou Mohammed Broadcasts Some Success Slogans

**By JOE OSIER.**

"In business the middle way is best."

**Abou Mohammed,** a sheik who late in life made the sheiking business profitable, sat on a sand dune and stroked the hump of a camel reflectively. And—

**Following** a series of disastrous events, Abou had plenty to reflect upon. All his ventures had lost—his caravan scattered—his tribe departed—and his dream tent in the green oasis fallen about his ears.

**His worldly** possessions consisted of a mangy, humpy-lumpy, arm-chewing camel, a package of wormy dates and some untried philosophy, which, alone, sustained him.

**And so** he philosophized: "Of little use to hammer cold iron" and again, "In business the middle way is best."

**This said,** Abou Mohammed wrapped a moth-eaten blanket around his shoulders, burrowed deeper in the sand and dreamed of yards of fiction and rods of film wherein and whereupon he was featured as the Sheik of Arabia who threw lovely ladies for losses in many Carnegie libraries and for many continuous performances.

**Business men** who find themselves in the same predicament as did Abou could profitably follow his example. When illusions totter and fall, when dream castles come smashing to earth, when cataclysm follows catastrophe—remember—

**It is** futile to hammer cold iron. Abou said so. Still, this self-same iron can be heated with new hope and new effort directed along more conservative lines and these lines, provided they lead to success, will lie along the middle course.

**Bite off** what you can chew—contract for that which you can accomplish—

Time for Abou to start digging!

promise what you can fulfill and walk breast-forward, unfearing in the eyes of your fellowmen.

**And, when** you are urged to leap and advance by bounds, accommodate your steps to those of the heavy sugar Johns who run as though they had eggs in their shoes.

**Abou Mohammed** fumbled the deck and misdealt once. The next time he slipped himself four aces—pat.

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**Latourrette-Fical Company** of Sacramento, Calif., has recently been awarded the electrical contract on the new Union Electric Terminal to be erected at Eleventh and H Streets, that city. The Sacramento Northern Railroad will own the site and the building, although it will be used by the Sacramento Northern, the San Francisco-Sacramento Short Line and the Central California Traction Company. The contract amounts to $4,365.

# Demonstrating the Advantages of Better Light

## Adaptations of All Classes of Illumination Are Shown at Recently Opened Edison Lighting Institute

By H. KAY LYNN.

In the interests of the developing of the art and practice of lighting, the Edison Lamp Works of the General Electric Company has recently opened the Edison Lighting Institute at Harrison, N. J. The Institute is to be devoted to the service of the electrical industry, and in this capacity it will function as the experimental laboratory, school of merchandising practice and show window for the industry.

The Institute has been designed to satisfy the need for a practical means of demonstrating the correct applications of light, registering the advancements made in lamp-manufacturing methods and depicting the versatility of light. It is the desire of the Edison Lamp Works that the Institute give body and form to its service for the good of the entire industry.

The demonstrations conducted at the Institute clearly depict the ever-widening scope and influence of artificial lighting in all phases of our national life—industrial, commercial, and residential. They show graphically the potentialities of light as an industrial asset, as a business stimulant, as an instrument in scientific work and as a source of comfort and convenience in the home. They portray artificial light in its true character as a commercial commodity and cover completely the development, manufacture, merchandising and use of every type and style of incandescent lamp.

The exhibit has been housed in a specially designed building in Harrison so arranged that the individual displays may be shown to the best advantage. One of the features of the exhibit is a modern five-room apartment which has been lighted in approved fashion. These rooms, as well as the rest of the display, will be open to all who may be interested in better lighting.

On entering the Institute the first display of equipment to show the correct utilization of light is the reception room where there is an exhibit of lamps used at different periods in history that trace the progress in the science of lighting from early times to the present. Special attention has been given to the history and development of the incandescent lamp. Here is shown the lamp as Edison invented it in 1879. Then in sequence are arranged lamps incorporating new discoveries in material and improvements in methods of construction. In the reception room there is also a complete assortment of every type and size of incandescent lamp used in home, commercial and industrial service, from the 30,000-watt lamp, the largest in the world, to the tiny grain-of-wheat lamp used in surgical work.

The auditorium, a large room arranged and equipped for giving complete demonstrations on any subject pertaining to general lighting, is provided with a large amount of special equipment. These facilities permit the demonstrating of the three principal methods employed in commercial lighting, namely, direct, semi-indirect and totally indirect; effects that may be produced by color, distribution, intensity, direction and motion in window lighting; modern methods of stage lighting with disappearing footlights, overhead lights, spot lights and color lights; and high-intensity illumination from above the sky-light for lighting commercial or exhibition art galleries.

The other exhibits in the Institute are devoted to specialized demonstrations of the uses of light for various purposes. One of these is prepared to present the five different types of industrial lighting showing the effects of intensity, distribution, diffusion, glare, and effects of intensity of various colors used on walls and ceilings. Typical equipment used in the various fields of industrial lighting is included in the exhibit.

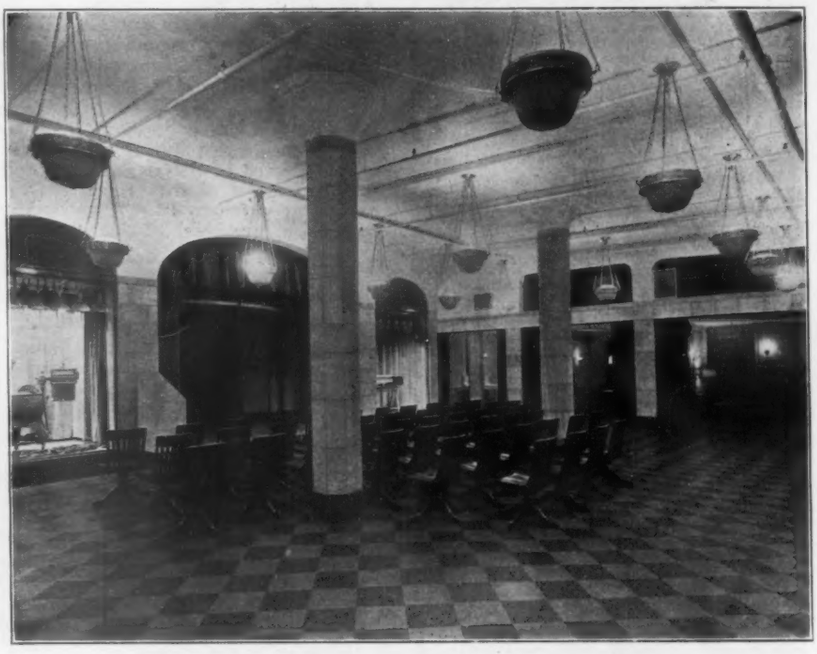
To illustrate good practice in modern street lighting, two model minature streets are used to demonstrate whiteway or business section lighting and residence street and highway lighting. The street lighting exhibit contains a display of the principal types of poles, brackets, pendents and ornamental fixtures, glassware, and control and operation accessories used in different systems of street and highway illumination. Demonstrations of lighting for offices, lobbies, reception rooms and public buildings also are presented.

Modern store lighting is shown in a model store, complete in every detail where the advantages of good lighting and the disadvantages of poor lighting in the sale of merchandise are demonstrated. This exhibit shows proper methods of lighting a store interior, show cases, display material, and so on and includes a demonstration of how the appearance of a store may be changed by the use of high-level illumination. From another position an exterior view of the store is shown and a demonstration given of the effects of various intensities of illumination; the use of color lights, spot lights and any number of combinations of show window lighting systems.

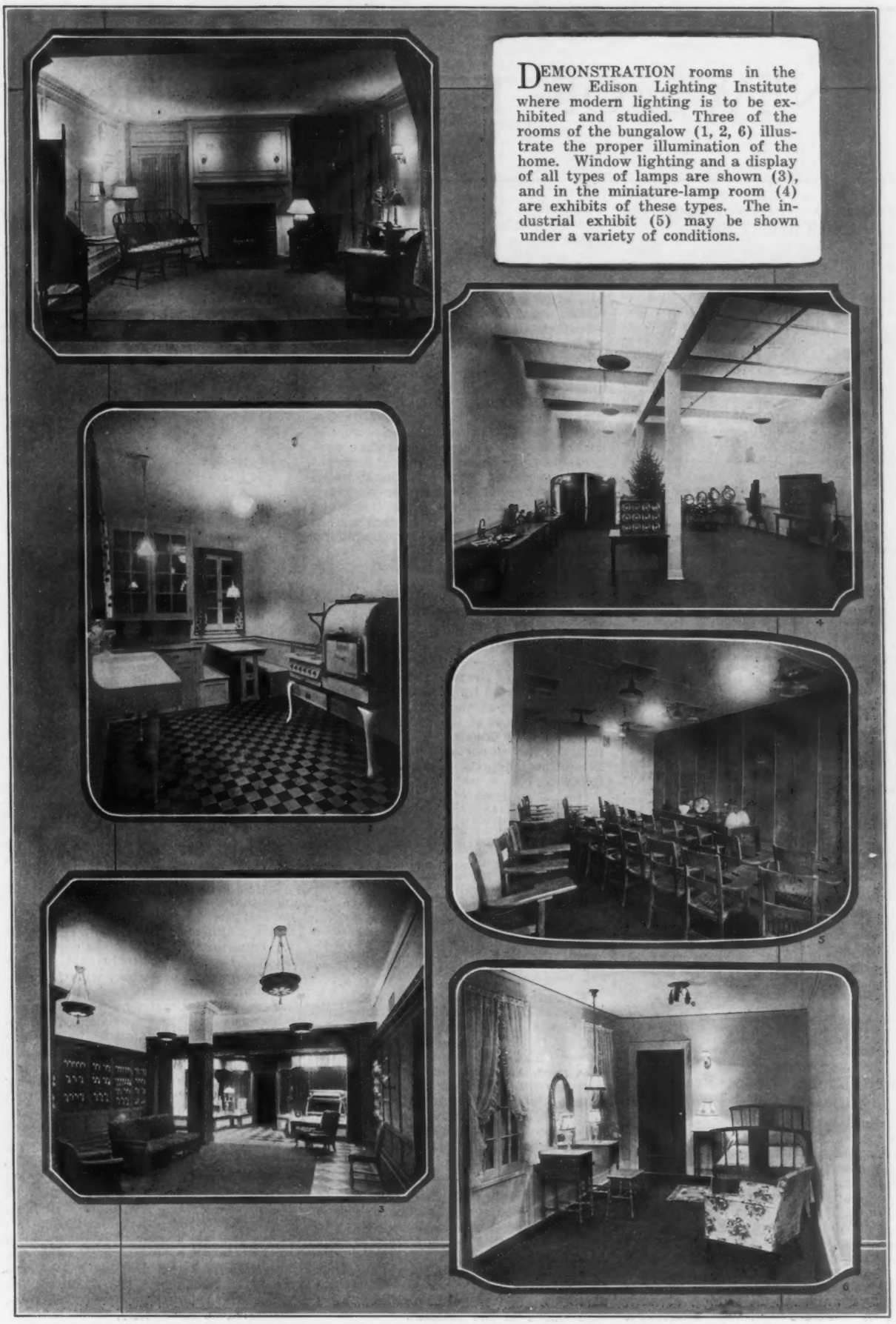
Proper lighting in the modern home is displayed to advantage in the home-lighting apartment where five modern rooms—a living room, bedroom, dining room, kitchen and bath have been furnished to demonstrate a great variety of methods and types of lighting that may be employed to make the home comfortable and attractive. The use of elexit plates on all outlets other than the conventional convenience outlets has made it possible to show alternate solutions to each lighting problem in a practical and effective way. All lighting fixtures easily may be removed or interchanged and there are facilities for pointing out what is bad as well as what is good. In addition to the interest as a display the rooms are to be home-lighting experimental laboratories.

Another one of the rooms of the Institute has been designed as the concentrated filament and miniature lamp room. It is devoted to the applications of these types of lamps. Here are demonstrated different types of auto headlight beams, the effect of glare-reducing devices on these beams, control of light by special shape reflectors, the effect of manufacture and design of lamp filaments on the resulting beam of light. In fact, every problem pertaining to head lighting is fully demonstrated. Other parts of this exhibit show the application of lamps for use in automotive accessories; the correct type of lamp equipment and wiring for motor-bus lighting; the use of miniature lamps in toys; the application of beacon lights for use in air-mail service; flood-lighting projectors in various applications; demonstrations of motion-picture projection lamps and motion-picture screens.

The Institute has been given a definite task to perform in aiding the electrical industry to secure better lighting in all classes of installations.



The Auditorium in the Edison Lighting Institute.



DEMONSTRATION rooms in the new Edison Lighting Institute where modern lighting is to be exhibited and studied. Three of the rooms of the bungalow (1, 2, 6) illustrate the proper illumination of the home. Window lighting and a display of all types of lamps are shown (3), and in the miniature-lamp room (4) are exhibits of these types. The industrial exhibit (5) may be shown under a variety of conditions.

# NEWS OF THE INDUSTRY

## Opinion on Agency Disposal of Hetch Hetchy Power.

The question of whether San Francisco has the legal right to dispose of its Hetch Hetchy power through the agency of existing power companies is one on which there has been much discussion in that city. In an effort to make the matter more clear to the general public, the San Francisco Chamber of Commerce has printed in the March 6 issue of its organ, San Francisco Business, the pertinent parts of an opinion rendered by its legal adviser, Col. Allen G. Wright, of the firm of Wright & Wright & Stetson, in December, 1923. It also gives the following digest of the opinion:

1. San Francisco has no authority to sell or lease Hetch Hetchy power to any corporation for resale.

2. The city may enter into an agency agreement provided such agreement is not a mere subterfuge for wholesaling of power.

3. Under a lawful agency agreement compensation of the agent could be a fixed sum or a definite rate or any other definite compensation and all risks of the business would fall properly on the city as the principal and owner of the electric energy.

4. The legality of such an agency agreement was sustained by the Supreme Court of California in 1922 relative to a similar agency contract entered into by the city of Los Angeles pending the acquisition of its own distribution system.

5. The court held that this agency contract was not a violation of the letter or the spirit of the Los Angeles charter, the provisions of which were more restricted and more definite than the provisions of Sec. 6 of the Raker Act.

6. The Raker Act does not expressly oblige the city to go further than to transmit its electric power.

7. The main purpose of the Raker Act was to assure an adequate supply of water with the development of power as a by-product.

8. The obligations of the Raker Act may be weighed with relation to their own due proportions.

9. The Solicitor of the Department of the Interior suggests the use of such an agency contract as one solution under the Raker Act.

10. The city has an obligation under the Raker Act to use the electric energy developed or to offer it for use. If the people cannot be persuaded to vote bonds for power distribution, the city must, if it can, enter into an agency contract for the transmission and distribution of its electric energy.

11. Failure to distribute the power either directly or through an agency contract would expose the city to legal proceedings on the ground that the provisions of the Raker Act "are not reasonably complied with and carried out by the grantee."

## Priest Rapids Hydro Project Is Granted Federal License

A license covering the Priest Rapids project of the Washington Irrigation & Development Company on the Columbia River about 50 miles east of Yakima, Wash., was authorized at a meeting of the Federal Power Commission held March 3. The license covers a 750,000-hp. development according to the company's application, the dam is to be two and one-half miles long and will form a reservoir with a storage capacity of 85,000 acre-ft. The dam will be composed of an earth-fill section at each end, a concrete spillway section, a powerhouse section, and a concrete gravity section having fishways, an ice chute and a lock entrance to provide for possible future navigation facilities. The primary power available at the site is 201,000 hp. The initial installation will be 340,000 hp. with provision made for an ultimate installation of approximately 750,000 hp.

At the instance of the Chief of Engineers the license is to carry conditions governing investigation as to the plans for the dam and the selection of its site, the preservation and protection of navigation facilities, the protection of fish (up to an expense of $300,000), the rights of irrigation projects to use of the waters, the maintenance of rights granted to the Hanford Irrigation & Power Company, which obtained a permit from the Secretary of War in 1906, and the determination of legitimate cost and investment by the commission.

## Seek Six State Colorado River Compact Ratification

A movement providing for the ratification of the Colorado River compact to make it effective upon the approval of six of the seven states involved has been started by the Colorado Legislature. Action on the matter is expected from the States of California, Colorado, Nevada, New Mexico, Utah and Wyoming. The important portion of the resolution adopted by Colorado is as follows:

That the provisions of the first paragraph of Article XI of the Colorado River Compact, making said compact effective when it shall have been approved by the legislature of each of the signatory states, are hereby waived and said compact will become binding and obligatory upon the State of Colorado, and upon the other signatory states which have ratified or may hereafter ratify it, whenever at least six of the signatory states shall have consented thereto and the Congress of the United States shall have given its consent and approval, provided, however, that this act shall be of no force and effect until a similar act or resolution shall have been passed or adopted by the legislatures of the States of California, Nevada, New Mexico, Utah, and Wyoming.

Wyoming has passed the resolution and the Legislatures of Nevada and California are considering it at the present time. The resolution introduced to the California Legislature carried a provision that the federal government first provide storage in the upper basin of the Colorado. In response to this provision Herbert Hoover, Secretary of Commerce, has requested that California remove any qualifications from its resolution.

**Home Lighting Contest Featured in Power Company Organ.**—The February issue of The Volt, published by The California Oregon Power Company, was devoted principally to announcing the winners of the Better Home Lighting Contest in the territory served by the company. Pictures of the winners were reproduced in the bulletin.

## 2,000,000-Volt Laboratory to Be Installed at Stanford

A 2,000,000-volt testing outfit, which will operate at the highest voltage ever produced at commercial frequency, has been ordered by Standard University for experimental work in connection with high-voltage transmission. The apparatus will be furnished by the General Electric Company and will include six transformers, two motor-generator sets and a switchboard.

The transformers are designed for the so-called "chain connection," and when three transformers are connected in series there will be 1,050,000 volts between the high-voltage terminal of

PROF. HARRIS J. RYAN.

the third transformer and ground. When six transformers are connected in series with the mid-point grounded, there will be obtained 2,100,000 volts between the outside terminals. It is expected that this voltage will jump a spark gap formed by two sharp points about 20 ft. apart.

Prof. Harris J. Ryan, authority on high-tension phenomena and past president of the American Institute of Electrical Engineers, will be in charge of the experimental work in the new laboratory. He will devote his entire time to research in connection with the new equipment.

A modern laboratory for housing the apparatus will be provided, and adjacent to the building will be a large plot of ground on which a transmission line several miles in length may be constructed for carrying on tests under conditions approaching those of actual service.

**Japanese Utility to Develop Two New Power Sites.**—The Tokyo Electric Light Company, Tokyo, Japan, contemplates the development of two power sites at Lake Inawashiro. The plants will have capacities of 14,000 kw. and 23,000 kw. respectively. These sites have been held in reserve for some time by the company, and the decision to develop them at this time is the result of the increase in the demand for power since the Japanese earthquake.

## Joint Development of Wynooche Proposed by Utility

Joint development of the Wynooche River by the city of Aberdeen, Wash., and the Grays Harbor Railway & Light Company has been proposed by the utility company. The company has submitted to the city council a proposition which provides for not holding the March 24 bond election at which the people of the city will vote on an issuance of $700,000 in bonds for the purpose of adding the Wynooche to the city's Wishkah River system. The company proposes that the city cooperate with it in the development of the Wynooche, the city to have the water supply, and the company the power development. The company declares that the joint development would guarantee the city an adequate water supply at a cost under $700,000. The company is represented in the discussion by H. W. Crozier of Sanderson & Porter, San Francisco.

A formal hearing will be held in Olympia March 30 in the office of the state supervisor of hydraulics on the application of the city for an extension of time to begin construction work on the Wynooche River hydroelectric project.

The request for the extension was contained in the answer made by the city to an order issued Jan. 5 requiring the city to show cause within sixty days why the rights of the city should not be cancelled, if development work had not been started before the expiration of that time. (Journal of Electricity, Feb. 15, 1925, p. 150.) The Grays Harbor Railway & Light Company, which also has filed on water power rights on the stream, later amended its application to recognize the prior right of the city to divert water for municipal supply.

## Senate of Arizona Rejects the Colorado River Compact

A resolution proposing ratification of the Colorado River Compact as accepted by the other six states of the river basin has been defeated by the Arizona senate by a vote of 11 to 7, according to press dispatches. Three other resolutions proposing provisional ratification of the compact were withdrawn upon the defeat of the resolution referred to, and a resolution already adopted by the Arizona house of representatives taken under consideration. This resolution provides for ratification of the compact, if representatives of Arizona, California and Nevada can agree to a distribution of the water allotted to the lower basin that will be acceptable to a special session of the Arizona Legislature.

## Oroville, Calif., Contemplates Acquiring Power System

The board of trustees of Oroville, Calif., recently adopted a resolution calling on the California Railroad Commission to evaluate the power and light system serving the town, with a view to its acquirement by the municipality. The system is operated by the Pacific Gas and Electric Company, San Francisco.

The question of the municipal ownership of the light and power system has been discussed in Oroville for some time, according to local report, and with the purpose of obtaining the consensus of opinion the board has stated that the question would be submitted to the people at a special election. Some months ago the formation of a utility district to include Oroville and the surrounding district was discussed, but the present plan comprises a strictly municipal district within the city limits.

In 1917, at Oroville's request a valuation of the system was made by the Railroad Commission, which set the figure at $97,000. As improvements have been added since then and parts of the system have depreciated in value, an adjusted valuation is now asked.

## California Mountain Snow Pack Much Above Last Year's.

The snow pack in the California mountains is much above that of last year, according to the U. S. Department of Agriculture Weather Bureau, although it is from 60 to 72 per cent of normal. This is due to the fact that although snowstorms occurred frequently they were of short duration, and though there was heavy precipitation it was accompanied by comparatively warm weather and much of it was in the form of rain even at fairly high altitudes. The snow pack was increased, however, and there was much more snow on the ground at the end of February than there was at the same time last year. At the Summit at the end of the month the depth of the snow pack was 60 per cent of the nineteen-year average, at the Pacific Gas and Electric Company's Fordyce Dam it was 70 per cent, and at Tamarack 72 per cent. This is about the same condition as existed in 1923.

The February snowfall table follows:

| STATION | Elevation | Total precipitation in Feb.—In. | Total snowfall in Feb.—In. | Depth on ground end of Feb.—In. | same date last year.—In. |
|---|---|---|---|---|---|
| Bishop Creek | 9390 | 1.71 | 19 | 9 | 0 |
| Blue Canyon | 4695 | 18.21 | 43 | 4 | 0 |
| Cascade | 4900 | 6.90 | 6 | 0 | 0 |
| Chester | 4550 | 8.89 | 32 | 17 | 0 |
| Cliff Camp | 6150 | 8.94 | 29 | 21 | 0 |
| Deer Creek | 3700 | 19.25 | 9 | 0 | 0 |
| Dinkey Meadow | 5600 | 9.19 | 23 | 7 | 0 |
| Downieville | 3150 | 16.25 | T | 0 | 0 |
| Fordyce Dam | 6500 | 5.54 | 56 | 68 | 18 |
| Giant Forest | 6400 | 9.45 | 61 | 48 | T |
| Helm Creek | 8100 | 7.67 | 52 | 66 | 12 |
| Hetch Hetchy | 3665 | 13.05 | 7 | 0 | 0 |
| Huntington Lake | 6950 | 7.40 | 35 | 41 | 7 |
| Inskip | 4975 | 20.12 | 44 | 20 | 0 |
| Lake Eleanor | 4700 | 15.18 | 16 | 0 | 0 |
| Lake Spaulding | 4600 | 17.81 | 50 | 18 | 0 |
| La Porte | 5000 | 14.81 | 46 | 30 | 0 |
| McCloud | 3270 | 18.51 | 21 | 3 | 0 |
| Portola | 4832 | 4.23 | 21 | 0 | 0 |
| Quincy | 3409 | 10.27 | 3 | 0 | 0 |
| Sierraville | 5000 | 7.51 | 16 | 0 | 0 |
| Sisson | 3555 | 9.65 | 29 | 0 | 0 |
| Summit | 7017 | 7.00 | 70 | 66 | 24 |
| Tamarack | 8000 | 9.28 | 124 | 103 | 26 |
| Twin Lakes | 7970 | 10.28 | 97 | 86 | 20 |
| Yosemite | 3945 | 7.98 | 8 | T | 0 |

The snow pack was decreased considerably by the warm weather of the first few days in March, but snow fell again Mar. 6.

**Washington Plants to Be Electrified.**—The E. K. Wood Lumber Company's plant in Bellingham, Wash., is to be completely electrified, according to Fred J. Wood, president. The work is to start immediately. The Bloedel-Donovan Lumber Company, Bellingham, Wash., plans to expend $300,000 during 1925 in completion of electrification work in the company's big cargo plant.

## Will Investigate Report on Rate Schedules in Denver

Reports that uniform schedules of rates are not maintained by the Public Service Company of Colorado in Denver are to be submitted for investigation by the grand jury now in session in that city. The company is requesting a renewal of its franchise in Denver and hopes to have the vote taken at the next city election in May. Denver men consider the investigation to be a preliminary step of the opposition to embarrass the campany in its request for franchise renewal.

It is generally believed in Denver that this co-called investigation of rates for electric service to Denver consumers will not have any effect on the franchise. Instead local opinion is that the investigation will prove of benefit to the company if a true statement of facts is made by the grand jury as to the various forms of rates now available, especially for large power consumers, a number of whom were subpoenaed to appear before the jury and present their monthly bills.

C. N. Stannard, vice-president and general manager of the company, has just returned from another conference with Henry L. Doherty in New York City, at which final plans were outlined in connection with the request for a franchise renewal.

The city council has not taken definite action which will assure this matter being placed before the voters at the city election early in May.

## Application for Cowlitz County Hydro Project Filed

An application for the right to appropriate 225 sec-ft. of water from the north Toutle River, Cowlitz County, Wash., for generating hydroelectric power has been filed with Marvin Chase, supervisor of hydraulics, by Henry Waldo Coe of Portland. An application was also filed for reservoir rights on Spirit Lake to store 16,125 acre-ft. of water.

The water is to be used at a 700-ft. head and the plant will develop approximately 12,600 hp. at 70 per cent efficiency, the cost being estimated at $1,100,000. The power will be used for mining, lighting, manufacturing, and for the operation of a railroad in connection with the mining project. Any surplus will be sold to individuals desiring to purchase power.

The development involves the construction of a diversion dam 6 ft. high and 200 ft. long, an impounding dam at Spirit Lake 21 ft. high and 220 ft. long, and a flume line 9.75 miles long. The dams are to be timber-crib type, filled with rock, sand and gravel.

**Transmission Line Contracts Signed by Tacoma Commission.**—The last of the contracts for construction of the transmission lines of Tacoma's Cushman power project has been let by the commissioner of the light department. The Star & Steel Company of Tacoma will erect the towers which will carry the power cables spanning the Narrows. The bid for the towers and installing the cables was $148,803.55. Ward & Ward, Tacoma, will place the concrete footings for the towers. Puget Sound Bridge & Dredging Company, Seattle, will erect the steel towers on the city end of the line.

## "Public Relations" Contest for N.E.L.A. Power Companies

A contest to determine "the most constructive public relations campaign carried on by a light and power company in a local territory during the past year" was inaugurated March 1 by Forbes Magazine. It is open to all member companies of the National Electric Light Association, and three prizes will be awarded for the best data and exhibits submitted. The following data must be supplied:

a. Plan of campaign and how conducted.
b. Exhibits of all types of advertising and literature used.
c. Record of achievements as indicated by customer-ownership results, increased use of appliances, increased sales of light and power.
d. Data indicating growth of good will.

All exhibits and papers must be in the offices of Forbes Magazine, 120 Fifth Avenue, New York City, on or before May 1, the day the contest closes. The judges will be:

Bruce Barton, Barton, Durstine & Osborn.
Philip Thompson, publicity manager, Western Electric Company.
M. C. Forbes, editor Forbes Magazine.
Louis Wiley, New York Times.
Ray Dickinson, Printers' Ink.
Thomas F. Logan, Thomas F. Logan, Inc.

The winner, in addition to receiving a certificate of award, will be presented with a handsome cup. Appropriately engraved certificates awarding second and third prizes will be given to the two next best exhibitors. It is planned to make the award at the N.E.L.A. convention in San Francisco in June. The three prize-winning exhibits will be taken to San Francisco and as many others of the next best as is practical.

## Applications Filed on Western Washington Power Sites

Application for water power appropriations have been filed on two western Washington streams. R. F. Brown of Centralia, Wash., has asked for permission to divert 250 sec.ft. from the East Fork of the Cispus River, Skamania County, for the purpose of operating a plant with an estimated capacity of 20,000 hp. The water is to be used at a 600-ft. head.

Development work will involve the construction of a dam 100 ft. high and 400 ft. long. The completed plant will cost approximately $1,500,000. It will be located within the Rainier National Forest, and the power will be used largely for developing mining properties but will also be sold for commercial purposes. The dam and power house are to be of concrete construction.

An alternative application was filed on the Elwha River, Clallam County, by the Northwestern Power & Light Company of Port Angeles, asking for an appropriation of 600 sec.ft. of water to be used at a 150-ft. head. This plant would develop about 7,500 hp. of electric energy at a cost of about $800,000.

## Curtis Lighting Announces New Merchandising Policy

With the organization of Curtis Lighting of California, Inc., to distribute all lighting products of Curtis Lighting, Inc., of Chicago, in that state, certain fundamental changes in merchandising policies of great interest to the electrical industry have been announced. It will be the policy of Curtis Lighting to market its indirect lighting fixtures through electrical trade channels, cooperating with the dealer-contractor wherever X-Ray fixtures or other types of fixtures are sold by the corporation.

During the past ten years X-Ray interior parts were sold through lighting fixture companies. The arrangement did not prove satisfactory, owing to certain construction ideas which did not assure that these interior parts with reflectors would be used properly. Therefore, Curtis Lighting now will furnish lighting fixtures complete, which assures the contractor-dealer and consumer that the highest degree of lighting efficiency is secured by this method of marketing.

Under no consideration will Curtis Lighting of California, Inc., sell the direct lighting products as covered by its catalog No. 22, known as the window-lighting lines, flood-lighting projectors, show case lighting equipment and direct lighting reflectors. All of these will be handled, as in the past, through the electrical jobbers.

The box line of indirect lighting fixtures also will be sold exclusively by the electrical jobbers who regularly stock these lines.

## Stanford Electrical Engineering Fellowship Available

Announcement is made by Prof. Harris J. Ryan, Executive, Electrical Engineering Department, Stanford University, that there is available in that department of the university for the academic year 1925-26 a $500 fellowship known as the "Elwell Fellowship" after its donor, Cyril F. Elwell. According to the announcement,

It is required that an applicant shall have gained, at least, the degree of Bachelor of Science in Electrical Engineering or its substantial equivalent. A year's work normally leads to the degree of Engineer in Electrical Engineering.

Each application should set forth as far as may be practicable the plans of the applicant relating to his proposed program of studies, and also in relation to his probable choice of work following the year at Stanford. The applicant should request several persons who are competent to judge of his character and of his intellectual ability to write directly to the undersigned in support of his application. An essential part of every application is a transcript of all the grades made by the applicant in his previous college courses. This transcript must be an original document issued and certified by the registrar (or corresponding officer) of the college concerned.

Applications must be received by April 1. The fellowship will be awarded May 1.

The holder of the fellowship would be expected to have sufficient funds so that, with the assistance of the $500 attached to the fellowship, it would be unnecessary for him to do remunerative work during the university session to add to his income.

All correspondence on the matter should be addressed to Professor Ryan.

**California Utility Construction Program.**—The major construction program of the Coast Valleys Gas & Electric Company, Salinas, Calif., according to J. F. Pollard, its vice-president, includes the erection of a substation in that city at an estimated cost of $224,000; a 2,400-kw. substation at Gonzales; and the addition of a 2,250-kw. transformer bank to the Monterey substation. The company also plans to build at Salinas a 200,000-cu.ft. gas holder and 9-ft. straight shot gas generator and other plant improvements, and a warehouse and garages at Salinas and Monterey. G. F. Phythian, construction superintendent for the Bylesby Engineering & Management Corporation, will have charge of the work.

## Colorado Legislature Considers Adequate Lighting Bill

The Electrical Cooperative League of Denver has sponsored a bill providing for standardized lighting in places of employment, education and amusement. This measure was introduced shortly after the opening of the general assembly in Colorado, but, although it has been printed and reported out by the judiciary committee, no formal action has been taken on the floor, owing to a political deadlock between the house and senate on administration matters.

The bill empowers the state labor commissioner and his inspectors to establish adequate standards of lighting as measures of safety, and provides also for enforcement. The bill as introduced would be somewhat of a departure and improvement over similar legislative enactments in other states, which have limited jurisdiction to matters of industrial lighting. The Colorado bill has included consideration of school buildings of all types and places of amusement.

The bill was introduced by E. S. Hawkins, a prominent Denver journeyman, a delegate from that ctiy in the state house of representatives.

## P. G. and E. Company Occupies New Headquarters Building

The new seventeen-story headquarters building of the Pacific Gas and Electric Company at Beale and Market Streets, San Francisco, is almost finished, and the company's forces are moving in. Forty-eight head-office departments, with approximately 1,000 employees, will occupy the building.

This is the fifth time the company has found it necessary to move its headquarters, due to growth in the organization, since its incorporation in 1905. Originally in the Rialto Building, they were moved to the Shreve Building; after the fire in 1906 they occupied quarters in Franklin Street, whence they were transferred to 445 Sutter Street. In 1916 a new eight-story building which housed various departments, was constructed at 447 Sutter Street, but the company long since outgrew the space, and departments are quartered now in five different sections of the city. These departments all will be centralized in the new building, and the six- and eight-story buildings at 445 and 447 Sutter Street, that are being remodeled now, will be occupied by the San Francisco division. More commodious lobbies will be provided and there will be rooms for the display of the latest gas and electric equipment. All San Francisco business will be handled at these offices.

**Progress on Baker River Project.**—The dam on the Baker River development of the Puget Sound Power & Light Company, Seattle, is now 70 ft. above bedrock, according to W. D. Shannon, general superintendent for Stone & Webster, Inc. There are over 1,000 men on the job, and work is proceeding at a good rate. During January rainfall amounted to 14 in., with the rest of the winter in proportion; in February, however, there were only 10 in., so it is hoped that, with the promise of good weather, construction will advance at greater speed. Details of the Baker River plant were published in Journal of Electricity, Sept. 15, 1924, p. 220.

## Edison Company Awards Cups for District Efficiency

Two silver cups, to be known as the Charles A. Coffin Foundation awards, have been purchased by the Southern California Edison Company with the $1,000 cash award accompanying the Charles A. Coffin Foundation Medal that was won by that company last year. One cup will be awarded annually to the district having the highest commercial record and the other will go

The commercial cup won by the Pomona district.

to the district having the highest operating record for the year.

The first award of the cups has just been made, the Pomona district, C. E. Houston, district manager, and J. S. Kier, district superintendent, receiving the commercial cup, and the Long Beach district, W. P. Graef, district manager, J. F. Hodges, district superintendent, winning the operating prize for the year 1924. The commercial cup was awarded by a committee composed of W. L. Frost, general commercial manager, chairman; A. W. Childs, general sales manager; F. L. Greenhouse, manager of investment department, and Glenn Dalrymple, chief accountant. The committee awarding the operating cup included R. E. Cunningham, assistant manager of operation, chairman; Fred Hamilton, general superintendent of distribution; R. G. Boyles, superintendent of distribution; W. J. McCullough, general storekeeper, and F. C. McLaughlin, chief construction and operating accountant.

Considerable study was given to the awarding of the prizes and the following five major factors were considered for commercial activities:

General efficiency and cooperation.
Collections.
Sales.
Public Relations.
Appearance of company's properties.
Sale of company's junior securities.

These five major factors were subdivided into 28 sub-factors as follows:

**General Efficiency and Cooperation.**

(a) Number of errors in billing in proportion to meters July 1, 1924.
(b) Condition of office records.
(c) Promptness in submitting reports to general office.
(d) Cooperation with traveling auditors.
(e) Percent of clerical efficiency in proportion to applications submitted.
(f) Cooperation of district in handling applications.
(g) Personal appearance of commercial employees.
(h) Cooperation of district with sales department.
(i) Cooperation with credit department.
(j) Cooperation with securities department.
(k) Unit cost in handling consumer's accounts, consideration being given to district characteristics.

**Collections.**

(a) Relation of average number of accounts delinquent through year to total number of monthly accounts.
(b) Ratio of number of accounts delinquent to total number of accounts as of July 1, 1924.
(c) Relation of average number of closing bills delinquent to total accounts delinquent.
(d) Bad debt losses based on percentage of loss to gross income of 1924.

**Sales.**

(a) Percent of quota obtained in appliance sales.
(b) Lamp sales in relation to number of lighting consumers as of July 1, 1924.
(c) Window dressing as a sales medium.

**Public Relations.**

(a) Reputation of district in maintaining good public relations.
(b) Reputation of district for cooperation with civic and public organizations, Farm Bureaus, N.E.L.A., etc.
(c) Attitude of counter employees toward customers.
(d) District standing with newspaper editors.
(e) Percentage of Railroad Commission complaints.
(f) Esprit de corps.

**Appearance of Company's Properties.**

(a) Office appearance.
(b) Warehouse appearance.
(c) Garage appearance.

**Sale of Company's Junior Securities.**

(a) Percent of quota 7 per cent preferred stock.
Stock sales and resales in shares per district employees for 1924.
Percent new stockholders per district employees for 1924.

One hundred points were allowed for a perfect score for each sub-factor making a possible 2,800 points, and the thirty-one geographical districts were graded accordingly. The Pomona district, having the highest number of points for the 28 sub-factors, was awarded the commercial cup.

The awarding of the operating cup was determined by considering six major operating items.

Construction efficiency.
Operating and maintenance expense.
Accounting accuracy and experience.
District store operation.
Labor conditions.
Accidents.

Construction efficiency was based on the percentage of labor to material costs. Operating and maintenance expense was based on ratio of actual cost

The Long Beach district was awarded the operating cup for 1924.

to theoretical cost, taking into consideration the number of consumers. Accounting accuracy and expedience were based on accuracy of applications, accounting, filing and general. District store operations were based on stock turnover, cost of operation, average accounting conditions and average physical conditions. Labor conditions were based on labor turnover and the general labor situation. Accidents were based on industrial accidents, damage to others' property due to employees and automobile accidents, including company owned cars and damage to non-company owned cars.

Each of the above factors was divided into a possible 100 per cent as follows: Construction efficiency 30 per cent, operating and maintenance expense 30 per cent, accounting accuracy and expedience 15 per cent, district store operations 10 per cent, labor conditions 10 per cent, accidents 5 per cent.

The cups are of sterling silver and

C. E. HOUSTON

J. S. KIER

W. P. GRAEF

J. F. HODGES

were especially designed for the Edison company. They are 22½ in. high, have an extreme diameter of 13¼ in. and are appropriately decorated, depicting the generation and distribution of electricity.

The cups will be displayed in a conspicuous place in the principal offices of the districts to which they were awarded, with a printed explanation nearby so that customers and the public may learn the story at a glance. It is the intention of the company to award the cups yearly to the districts having the best record for the previous calendar year, and it is expected that there will be a healthy rivalry between the districts in order to deserve the cup for each year. It is believed this will have a beneficial effect upon local operating conditions.

## Consider International Aspects of River Development

Washington Correspondence.

Opinion in Washington is divided as to the best course to pursue in the matter of the international aspects of the development of the Colorado River and Rio Grande. The Minister of Foreign Relations for Mexico has issued a statement to the effect that Mexico does not desire to consider the equitable distribution of the waters of the Rio Grande as a separate issue and would like to consider that question in conjunction with the distribution of the waters of the Colorado.

While the principle of the prior appropriation and beneficial use of water applied internationally. In fact,the State is contended that this principle is not applied internationally. In fact the State Department policy is based on an opinion by Attorney General Judson Harmon which sustains that point of view. As applied to the Colorado, it would mean that Mexico would acquire no prior right by putting water to beneficial use if the water of the river should be increased before lands on the lower river in American territory were ready to make use of the water.

Regardless of the letter of international law, other officials point to the fact that the United States almost without exception has made concessions when dealing with a smaller or weaker country. If the low water flow of the Colorado is increased it is certain that it will be put to beneficial use in Mexico where there is a large acreage which can be easily and quickly developed as the Colorado is regulated. While it may be in entire accordance with international law for the United States subsequently to deny this increased water supply to the lands below the Mexican border, it is practically certain, some officials declare, that no such step will be taken. For that reason, they urge that the treaty negotiations which were interrupted in 1913 be resumed at the earliest moment.

On the other hand, there are other officials who believe it to be entirely unnecessary to have any understanding or treaty with Mexico dealing with the American development of the Colorado River. Under international law, they point out, the United States has absolute and exclusive jurisdiction over the Colorado River within our territorial limits. "We maneuver ourselves into a very undesirable and unnecessary position," they say, if we assume that we must delay the development of the Colorado River to suit the pleasure of Mexico. In similar fashion, however, Mexico controls important tributaries of the Rio Grande. It is in a position to trade concessions of value to American settlers in the Rio Grande basin for rights to Mexican lands on the lower Colorado.

The whole question is being considered actively by the State Department at the time. It is expected that a policy which will be pursued in connection with the Rio Grande and the Colorado will be worked out in the near future.

## National Lamp Works Issues "Four Star Book for 1925."

The 1925 edition of "Four Star Book", published annually as a reference book for its dealers, has been issued recently by the National Lamp Works of the General Electric Company, Nela Park, Cleveland. The four stars from which the book takes its name stand for:

Star One—Get people in. Plan your windows, your outside signs. Make your store look attractive, and make it known by its look, to people who pass.

Star Two—Display your goods. Plan the way your stock is arranged, have articles identified, remind folks of the merchandise which most people buy.

Star Three—Talk your goods. Make sales, instead of waiting for most of them to start with the customer. Plan your selling.

Star Four—Go out and sell. For every sale made in your store there are many others to be made outside. Get them—by going where they are. Plan for volume and turnover.

This "Four Star" plan, it is explained, grew out of the experience of the most successful of thousands of store-keepers in the industry.

Excellent illustrations depict various window trims, store displays, and selling aids, with detailed descriptions and prices given on a separate page. "Ten Tips on Outside Selling" give pertinent hints on that subject.

Much space is devoted to the advertising scheduled to be carried by the company in nationally known mediums, with special pages for advertising to women, to merchants and to factories, outdoor advertising, hints for local advertising, and suggestions for advertising novelties that please customers. A cordial invitation is extended to the dealer to visit Nela Park and also to attend the lighting school courses given there, or, if that is impossible, to avail himself of Nela service.

**Washington Water Power Company Plans Duplicate Circuit for Railroad.**—The new 110,000-volt Taunton-Neppel power line built last spring by The Washington Water Power Company, Spokane, has been cut in. This line runs from Taunton on the Chicago, Milwaukee & St. Paul Railway, where it makes a contact with the 110,000-volt Intermountain line that supplies the railroad, to Neppel in Grant County, 26 miles, where it connects with the new Grant County transmission system. It is planned to have this Taunton-Neppel line form part of the 110,000-volt line that is now being built from the Long Lake power plant to Stratford, a distance of 86 miles, where it will merge into a line running to Neppel. This latter line, which now has a capacity of 60,000 volts, will be rewired and insulated for 110,000 volts. When these plans have been effected, the result will be a complete new 110,000-volt circuit from Long Lake to Taunton.

## Electric Grain Elevator Built by Vancouver Company

The largest grain elevator on the Pacific Coast was put into service at Vancouver, B. C., Jan. 12, by the Vancouver Grain Company. The elevator has a storage capacity of 2,250,000 bu. of grain and is designed to be capable of handling between 75,000,000 and 100,000,000 bu. of grain per year.

A 1,000 kv. substation is installed in the building to handle the power and lighting load. Service is from the 12,000-volt line of the B. C. Electric Railway Company. The latest in switching, control and metering equipment has been built into the substation. Power-factor connection has been provided for in the installation of a set of static condensers. Power is supplied at 550 volts from a bank of three 300-kva. transformers while two 50-kva. units feed the lighting circuits at 220 and 110 volts.

Forty-five motors varying from 3 to 125 hp. and aggregating 1,831 hp. are installed in the plant. Three-phase, squirrel-cage motors are used throughout. All motors of more than 5 hp. are equipped with autostarters.

Construction work was handled by the Pacific Construction Company, Ltd. The building was started Aug. 1, 1924, and finished Oct. 9, 1924.

## Japanese Utility Orders Large Turbine Generators

Orders for two 35,000-kw., 11,000-volt, 50-cycle turbine generators and two 1,000-kw., 3,300-volt, 50-cycle house turbines have been placed with the International General Electric Company by the Hayakawa Electric Power Company of Kawasaki, Japan. The equipment represents the largest complete units ever sold by any company for export. The Hayakawa company will use the apparatus in parallel with its hydroelectric station in the Hamamatsu district for furnishing power to Toyko. The Hayakawa company is a subsidiary of the Toho Electric Power Company, which holds a controlling interest in the Daido Electric Power Company, one of the largest and most important power amalgamation in Japan.

The Toho company recently received from the International General Electric Company a 35,000-kw., 60-cycle steam turbine generator for use in the city of Nagoya in the southern part of Japan. The two turbines ordered for the Kawasaki station are physically larger than the one for the Nagoya installation. Each will have a net weight of about 785,000 lb. The rotors will weight 60 tons each, and will be 30 ft. long and 4 ft. in diameter. Except for the rotors, the apparatus will be shipped disassembled. The first complete turbine will leave Schenectady this summer.

**Heating Patents Upheld By Court.**—W. Wesley Hicks, electrical manufacturer of San Francisco, has received judgment in his suit against A. R. Fierce, O. W. Forsyth and the Electric Heating and Manufacturing Company of Seattle for infringement on his patents covering certain basic principles of electric heating apparatus. Judgment was handed down by Judge Frank H. Kerrigan in the southern division of the United States District Court for the Northern District of California on March 9, 1025.

# News of the Electragists

## Plans Progress for One Body Of California Electragists

An organization known as the Southern California Association of Electrical Contractors and Dealers was recently formed by the various local associations in the southern part of the state. At the present time it is the amalgamation of eleven already existing contractors' associations and covers approximately twenty-five cities. There is a number of associations in other cities already organized and being organized in local groups, and these will affiliate immediately with the central organization.

The plan of organization is as follows: An executive board made up of an executive committeeman from each local association. These executive board members are: C. E. Gregory, Compton Electric Company, Compton; J. F. Zweiner, San Diego; W. A. Rowley, The McNally Company, Pasadena; G. F. Crumm, Standard Electric Company, Van Nuys; L. C. Hart, Hart Electric Company, Moneta; P. H. Needham, Beverly Hills; S. F. Jones, Winder & Jones, Covina; P. R. Machtolf, Machtolf-Doll Electric Company, Glendale; H. L. Stolper, H. L. Stolper Electric Shop, Burbank; F. E. Elser, Los Angeles; J. J. Farley, Farley Electric Company, Fullerton; Frank McGinley, Harbor Electric Company, Wilmington.

From this executive board the following committee has been appointed by the president: Frank McGinley, Harbor Electric Company, Wilmington; F. E. Elser, Los Angeles; J. F. Zweiner, San Diego; J. J. Farley, Farley Electric Company, Fullerton.

The officers elected are: President, H. H. Walker, H. H. Walker Company, Los Angeles; vice-president, Frank McGinley, Harbor Electric Company, Wilmington; secretary-treasurer, C. W. Jones, Pomona Fixture and Wiring Company, Pomona; C. J. Geisbush, formerly field secretary of the Electrical Safety Exchange, which has become part of the association, has been appointed field secretary of the new organization.

The executive committee is to meet with a similar committee of four from the California Electragists, the organization covering northern California, for the purpose of completing details establishing a statewide organization of California electragists.

This committee is composed of: Victor Lemoge, president of the California Electragists, Walter F. Price, executive secretary, and C. L. Chamblin, California Electrical Construction Company, all of San Francisco, and H. H. Courtright, Valley Electrical Supply Company, Fresno.

This meeting will be held in Los Angeles March 27.

This is the outcome of a meeting of contractor-dealers held in Los Angeles Feb. 11 at which tentative plans were outlined. These were ratified at the quarterly meeting of the California Electragists held in Sacramento on Feb. 14.

The proposed amalgamation is to be put into effect at an early date.

## Electrical Inspectors to Meet in San Francisco in March

The California Association of Electrical Inspectors will hold its semi-annual meeting in San Francisco, March 26, 27 and 28, in Room 251 of the Board of Public Works in the City Hall. Letters have been sent to all city electricians urging their attendance at this important gathering. Interested members of the electrical industry also are invited to attend. Among the more important subjects that will be discussed at this meeting are: uniform ordinance for the Pacific Coast and standardized interpretations of the Code, 1925 National Electrical Code as recently recommended by the code committee of the American Engineering Standards Cammittee under the sponsorship of the National Fire Protection Association; diversity factors for heating and cooking loads; wattage limitatoins for branch circuits; single-pole fusing and switching; proposed changes in general order No. 64 of the Railroad Commission; proposed changes in the Industrial Accident Commission rulings; street lighting; report on the actions of the Western Association of Electrical Inspectors.

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**NePage, McKenny Company,** San Francisco, has recently been awarded the electrical contract on the Clift House Annex which is being erected in that city. The electrical work will amount to approximately $35,000.

## Eureka Annual Convention City of California Electragists

The sixteenth annual convention of the California Electragists will be held at the Eureka Inn, Eureka, during the first week of August, 1925. This is the result of a mail ballot recently conducted by Walter F. Price, executive secretary of the California Electragists. The delegation of electragists from Humboldt County has advised the association that the Chamber of Commerce of Eureka had pledged an entertainment fund of $750 if the convention was held there, and this offer has been accepted. It is hoped that a large number of the members will plan to attend the convention as part of their vacation trip. Details of the arrangements are being worked out and will be announced iin a later issue.

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## Northern Counties Development League Meets at Corning

The Northern Counties Electrical Development League held its regular dinner meeting at Corning, Calif., Feb. 26, with twenty-eight members present. The principal speaker of the evening was LeRoy H. Crandall, field representative of the California Electrical Bureau. Mr. Crandall gave an interesting address on organization and what it means to the contractor and dealer; and on merchandising major electrical appliances. A general discussion of better wiring standards followed, and many interesting points were brought out by the members.

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**Nollenberger & Dorner,** electrical contractor-dealers in Denver, have dissolved partnership. Theodore Nollenberger will continue the business under the name of Nollenberger Electric Company.

# Pacific Coast Electrical Association

## Report Is Presented on Meeting of Apparatus Bureau

A complete report on the meetings of the apparatus bureau of the Technical Section of the P.C.E.A. held in San Francisco, Jan. 7-9, has been prepared for the members of the association by C. E. Schnell, San Joaquin Light & Power Corporation, and W. L. Winter, Westinghouse Electric & Manufacturing Company, secretary of the committee. The report is presented below.

**COMING PACIFIC COAST ELECTRICAL ASSOCIATION MEETINGS**

**Technical Section—**
Conclave and Executive Meeting—San Joaquin Light & Power Building, Fresno, Calif.
March 25-27, 1925

**Commercial Section—**
Conclave and Executive Meeting—San Joaquin Light & Power Building, Fresno, Calif.
April 3-4, 1925

**Pacific Coast Electrical Association—**
Annual Meeting—San Francisco, Calif.
June 15, 1925

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Oil-circuit-breaker design and application were fully discussed by the apparatus bureau under the direction of Mr. Schnell. Increasing concentrations of power upon the systems of power companies have brought about increasingly severe operating duty upon the circuit breakers. Particularly is this true under conditions of short circuit.

Various methods of increasing the rupturing capacity of present circuit-breaker equipment were discussed. Some of the factors which have been found to make more satisfactory the operation of oil breakers are as follows:

Vents on each tank piped to a common header.
Individual vents on each tank.
Reinforcing the tank.
Rebuilding the operating mechanism.
Increasing the operating speed.
Use of the magnetic blow-out principle.
Addition of more breaks.
Use of increased amounts of oil in breaker tanks.
Frequent changing or filtration of oil.

According to the reports rendered these various factors, used either singly or grouped, have resulted in better operations. Much discussion took place relative to the merits of these suggestions.

One oil for both switches and trans-

formers was another subject which brought out much discussion From the point of view of the operating company, one common oil has proved to be entirely satisfactory and more economical. However, the manufacturers point out that the viscosity of circuit-breaker oil is double that of transformer oil and that the use of low-viscosity oil in breakers results in more splash and greater fire hazard. It was conceded that in most cases the advantages of the use of one common oil for both purposes more than offset the disadvantages.

Discussion on two-break versus multi-break switches showed a divergence of opinion and operating experience. Some claimed that multi-break switches were more efficacious, while the manufacturers pointed out the fact that this type had been tested exhaustively and experimented with and finally abandoned in favor of the improved two-break design. Operating experience of some companies was in support of this contention while others seemed to show that increasing the number of breaks was satisfactory. No definite conclusions were reached.

Transformer operating characteristics and application have received wide attention. The possibility of secondary explosion has been greatly reduced by the new development whereby all oxygen is removed from the tanks above the oil and replaced by inert gas. This is known as inertaire. None of these new transformers are now in service on the Pacific Coast, but some are on order.

Ration adjusters and heavy-duty tap changers have been used successfully on transformers of voltages up to 110 kv. where frequent changes are necessitated by changing conditions.

Temperature indicators, so located as to give the temperature of the hottest spot in the transformer coils, are the latest development along this line and are much more satisfactory than those registering the oil temperature. The design used by the General Electric Company is a coil which is wound in between the layers of one of the main coils. These are used even on 220-kv. transformers for they are placed on the low side. The hottest coil is always picked for this service so that the temperature indicated is that of the hottest coil. Load regulation by transformer temperature rather than by amperage was recommended by one delegate. Pressed-steel tanks for distribution transformers were decided to be better than cast iron from all points of view.

Oil purification by means of a centrifuge versus a lter press was discussed. The final consensus of opinion seemed to be that the use of the former for the removal of sludge and heavy material followed by the filter was the ideal combination as the filter press so quickly becomes clogged and does not remove all of the sludge.

An interesting test run by the Pacific Gas and Electric Company was described by H. A. Laidlaw of that company. A barrel of oil was selected and into this was put salt, shellac, and other impurities until the oil would stand no test whatever. The mixture was then put through the two processes separately to test the efficacy of each. It was found that one passage through the centrifuge brought the oil up to a 30,000-volt test while three passes through the filter press failed to bring it this high.

Frequency changers for power interchange in various parts of the country were discussed. The possible use of surplus capacity in these machines for power-factor correction was suggested. Some success along this line was reported by C. F. Benham, Great Western Power Company. Eastern applications of frequency changers permitting a frequency range up to four and one-half per cent were mentioned. Automatic induction regulators for permanent 60-kv. tie-in purposes were mentioned by Mr. Laidlaw.

Tap changing under heavy load conditions was briefly discussed as also were relay operation and testing practice and system calculating tables. Step-by-step tap changers have been made for service as heavy as 9,000 amp. at 250 volts and on 10,000-kva. high-tension banks. Discussion of the testing of only the relay equipment versus including the current transformer and circuit breaker brought out the obvious advantages of the latter. System calculating tables are more than worth their cost in the opinions of some while others claim that they do not always give the results desired.

Automatic substations, current-transformer design, and fire-fighting equipment were given consideration. Various types of current transformers are being experimented with, and the results of these tests will be studied. The use of carbon dioxide for fighting electrical fires in comparison with other retardents evoked various opinions.

Station electrical grounds and the wide divergence in operating practice with respect to grounds aroused spirited discussion. The general practice on the Pacific Coast seems to be the solidly grounding of neutrals, regardless of the fact that in many cases it is known that there are ground currents. Experience would seem to recommend that all metal equipment around the station should be grounded for the purpost of protecting the operators if for no other reasons. Some companies, however, do not ground meter cases. Objection to the Eastern practice of inserting a resistance in the ground leads was voiced mainly because of the undesirable effect of such a resistor upon relay operation in many cases. A comprehensive treatise upon station grounds was read by F. H. Mayer, Southern California Edison Company, and was later published in the Jan. 15, 1925 number of the Journal of Electricity.

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**Technical Section Meetings to Be Held in Fresno.**—The executive and conclave meetings of all bureaus of the Technical Section, P.C.E.A., will be held in Fresno, Calif., March 25-27. All meetings will be held in the San Joaquin Light & Power Corporation Building. Headquarters will be at the Fresno Hotel. The schedule of meetings is as follows:

**Schedule of Meetings.**

| BUREAU | Wed. Mar. 25 a.m. | Thur. Mar. 26 a.m. | Fri. Mar. 27 a.m. |
|---|---|---|---|
| Hydraulic Power | 10:00 | | |
| Underground Systems | 10:00 | | |
| Meter | 10:00 | 9:30 | |
| Accident Prevention | 10:00 | 9:30 | 9:30 |
| Overhead Systems | 10:00 | 9:30 | 9:30 |
| Apparatus | | 9:30 | 9:30 |
| Inductive Interference | | | 9:30 |
| Prime Movers | | | 9:30 |
| Safety Rules | | | 9:30 |
| | p.m. | p.m. | p.m. |
| Executive Committee | 6:30 | | 4:00 |
| General Meeting | | 8:00 | |

# Book Reviews

## CIRCUIT TROUBLES AND TESTING

By TERRELL CROFT, Consulting Engineer. Directing Engineer of the Terrell Croft Engineering Company. 212 pages, 237 illustrations. $2.50. McGraw-Hill Book Company, Inc., New York, N. Y.

In this work the author has succeeded in bringing together under one cover a large number of practical schemes for localizing and correcting faults and troubles which occur on light and power circuits. The text is written in the characteristically straightforward way of the author and the language used is such that it may be readily understood by the electricians, wiremen and troublemen who have to go out on the job and do the work. While it is obviously not a technical man's book, technical accuracy is not sacrificed in the plain-language style used throughout. Therefore the directions given should be of use to any man who wishes to obtain authentic practical information on these subjects. A total of 237 illustrations ably supplement the text.

The text is divided into six divisions and each division is conveniently subdivided to afford the proper segregation of subjects.

A thorough, but brief discussion of the various instruments and devices used in trouble testing is given in the first division. Different kinds of test-clips and leads, fuse testing devices, and test lamp sets are treated. Various kinds of battery and magneto test sets, resistance measuring devices and tone-test devices are described and the working principles of each explained.

The location of faults in multiple transmission and distribution circuits is taken up in the second division. Common terms are defined. Trouble manifestations are discussed and various means for determining the nature of the fault are suggested. Many different methods of making resistance and capacitance tests and the use of audible or tone-test methods for locating faults are described.

Interior wiring circuits and methods for tracing out open circuits, short circuits, grounds, etc., are covered in the third division. Series circuits with their peculiar varieties of troubles and methods for conveniently localizing these troubles form the subject matter of the fourth division.

Insulation resistance is the subject of the fifth division. Under this head is given the purpose of insulation and insulating materials in general together with a discussion of their properties and qualities. Ways and means of measuring insulation resistance, of locating and testing both high- and low-voltage defective insulators, and of locating tree leaks are given.

Polarity and its determination are questions which are always coming up in connection with emergency work in particular. These questions as well as devices and methods incident thereto are treated in the sixth division. Questions are given at the end of each section covering the material included in that section.

# Meetings

## "Elektrik-Nite" Entertainment Held at Salt Lake

One of the most successful "get-together" events ever conducted by the members of the electrical industry of the Intermountain section was "Elektrik-Nite," staged by the Rocky Mountain Electrical Cooperative League at the Elks Club at Salt Lake City on the evening of Feb. 26. The affair was in the nature of stag social and smoker and was attended by about 350 members of the electrical fraternity and their friends.

At the conclusion of the program refreshments were served. All branches of the industry were well represented, and the event was voted as one of the best of its kind that the electrical people of Salt Lake City and surrounding territory ever have conducted.

The affair was in charge of the entertainment committee of the league, consisting of W. A. Moser, branch manager of the Westinghouse Electric & Manufacturing Company, chairman; G. J. Guiver, of the Holding Electric Company, and J. V. Buckle, of the Buckle Electric Company.

## Four Special Trains Will Bring Delegates to Convention

Reservations for transportation and hotel service for the forty-eighth convention of the National Electric Light Association to be held in San Francisco June 15-19 already are being made.

It is anticipated that at least 5,000 members and guests will attend the convention.

Hotel and transportation circulars were mailed to all members of the association on March 7.

The Convention Transportation Committee has urged all members and guests who contemplate attending the convention to make their reservations as soon as possible. This is necessary because of limited transportation facilities. The committee has reported that requests for accommodations on special trains will be honored in the order of their receipt. After the comfortable capacity of each special train has been filled the committee will be forced to decline other applications.

What is expected to be one of the most popular trains is the "Red Special," which will leave New York May 31 and stop over at various points of interest in Colorado, New Mexico, California and the Grand Canyon in Arizona, reaching San Francisco in time for the convention. After the convention the train will return over a northern route, stopping at Portland and Canadian points and reaching New York the last of June.

An extra fast train will be the "Blue Special," a duplicate of the famous "Broadway Limited." It will leave New York June 10 and reach San Francisco four days later. The "Green Special" will leave Chicago June 5 and embrace a nine-day sightseeing trip through Canada and Washington and Oregon, reaching San Francisco the night of June 13. An "Orange Special" leaving Chicago June 8 will make an abridgment of the "Green Special" itinerary and consume six days en route to California. Stopovers will be made at Spokane, Seattle and Portland.

Local power companies at the various stopovers will entertain members and guests on all special trains.

R. B. Grove, of the United Electric Light & Power Company, 130 East 15th Street, New York City, is eastern traffic manager, and G. H. Atkin, Electric Storage Battery Company, 613 Marquette Building, Chicago, Ill., is western traffic manager.

While hotel accommodations in San Francisco will be ample, C. E. Heise, chairman of the Hotel Committee, Room 527 Rialto Building, San Francisco, has requested that reservations be made as soon as possible. The hotel circular lists all of the principal San Francisco hotels with their rates.

## Court Denies Condemnation Right for Transmission Line

Because the electric energy to be developed at the Baker River plant of the Puget Sound Power & Light Company in Skagit County, Wash., is not intended essentially for public use, the company cannot acquire land by condemnation proceedings as right-of-way for transmission lines, according to a decision handed down in Olympia March 6. The decision upheld the Snohomish superior court, which had denied the right-of-way sought.

The trial court denied the condemnation order on the ground that the power company now has a surplus of approximately 23,000 hp. from plants already in operation and that a large part of the 18,000 hp. expected to be developed on Baker River would be diverted to uses other than public.

The company brought the case to the supreme court on a writ of review after condemnation proceedings had failed to secure easements over certain lands, the utility having been unsuccessful in negotiations with the owners.

### COMING EVENTS

**Commercial National Section, N.E.L.A.—**
New York, N. Y.
March 17-19, 1925

**Southwestern Public Service Association—**
Annual Convention—Rice Hotel, Houston, Texas
May 5-8, 1925

**Electrical Supply Jobbers' Association—**
Annual Convention—Hot Springs, Va.
June 1-6, 1925

**Associated Manufacturers of Electrical Supplies—**
Annual Meeting—Hot Springs, Va.
June 8-13, 1925

**National Electric Light Association—**
Annual Convention—San Francisco, Calif.
June 15-19, 1925

**Plans for Camp Cooperation V Made.**—The dates for the fourth annual conference of representatives of local cooperative electrical organizations, to be known as Camp Cooperation V, have been settled. This conference will again be held at Association Island, Henderson Harbor, N. Y., Sept. 8-12. The capacity of the island is limited, and as heretofore, it will be necessary to restrict invitations to duly accredited representatives of leagues now functioning and those interested in the formation of such organizations.

## New Executives Are Installed by Los Angeles Club

At the regular weekly meeting of The Electric Club of Los Angeles, held March 2, the officers for the past year retired from office and those for the ensuing year were installed by R. H. Ballard, vice-president and general manager of the Southern California Edison Company. The new officers of the club are as follows:

J. E. Macdonald, president; manager Joint Pole Committee; B. G. Wright, manager Los Angeles office Southern California Telephone Company; B. F. Pearson, manager of operations, Southern California Edison Company; S. E. Gates, Los Angeles manager General Electric Company, vice-presidents. R. J. McHugh, secretary-treasurer, manager Garnett Young & Company; R. H. Manahan, city electrician; J. G. Loomer, industrial sales engineer, Western Electric Company, sergeant-at-arms.

Members of the executive committee are as follows: G. E. Arbogast, president, Newbery Electric Coorporation; H. L. Harper, manager Western Electric Company; L. E. Moselle, chief clerk commercial department, Bureau of Power and Light; H. E. Sherman, Jr., vice-president and sales manager, Illinois Electric Company; W. L. Frost, manager, commercial department, Southern California Edison Company; K. E. Van Kuran, district manager Westinghouse Electric & Manufacturing Company. W. A. Knost has been reinstalled as executive secretary.

## Attendance Shows Nela Lighting Courses Popular

The increasing popularity of the lighting courses given by the engineering department of the National Lamp Works of the General Electric Company at the Nela School of Lighting, Nela Park, Cleveland, is evidenced by the fact that eighty-seven men representing central stations, electrical jobber and dealer organizations, fixture manufacturers, and other branches of the industry were enrolled in the twelfth illumination course held during the week of Feb. 9-13. The course covered intensive training in illumination fundamentals, practical problems in light designs and layouts, and the presentation of the commercial aspects of the various lighting fields by national authorities, with inspection trips to different laboratories and departments of the lamp works and to other industrial plants for practical demonstrations.

Plans are already under way for the thirteenth illumination course, which will be given during the week June 8-12 of this year.

A new activity of the Nela School of Lighting was the home lighting course for women in the electrical industry. It was given Feb. 2-5, 1925, and was attended by twenty-three women. "The Story of Light and Vision," "Results of a Residence Lighting Survey," "Wiring the Home for Good Illumination," Facts About Incandescent Lamps," were among the subjects covered, while light and color, artistic fixtures, portable lamps, home lighting problems and many other kindred topics were discussed. Demonstrations and inspection trips were interesting features of the course. A second course in home lighting is scheduled for Oct. 12-16, 1925.

# Personals

**M. W. Birkett,** vice-president and general manager of The Washington Water Power Company, Spokane, was recently elected to the board of trustees of that company, succeeding J. P. M. Richards, deceased. Mr. Birkett's advancement with the Washington utility has been rapid since he joined that organization in 1908 as a clerk in the transmission division of the light and power department. Within a comparatively few years he had advanced to the position of assistant superintendent of light and power. He was made assistant to the general manager of the company in 1918 and a year later was promoted to become assistant general manager. Late in 1921, when W. E. Coman resigned as vice-president and and general manager, Mr. Birkett was made acting general manager, and the following year he received the permanent appointnment. Since then he has been vice-president and in February of this year he was elected to the board of trustees. Mr. Birkett is a graduate of the University of Wisconsin.

M. W. BIRKETT

**W. S. Greenfield,** president of Allied Industries, Inc., San Francisco, recently spent several days in Los Angeles on business for his company.

**R. D. Thomas,** resident engineer of Curtis Lighting, Inc., Denver, has moved his office from 1073 Broadway to 209 Ideal Building.

**Frank R. Jamison** is now handling the advertising and publicity of the Public Service Company of Colorado at Denver since the death of **George W. Bixler.**

**Leo Dorner,** formerly of the firm of Nollenberger & Dorner, Denver, was a recent visitor in California.

**John C. Brown,** county surveyor of Weber County, Utah, has been elected president of the Ogden chapter of the American Association of Engineers, succeeding **C. W. Cross. E. E. Kidder, Ernest Gilgen, Arthur Grix** and **H. F. Irwin** were chosen vice-president, secretary, assistant secretary and treasurer, respectively. **Ora Bundy, B. J. Finch** and **B. W. Matteson** were named directors.

**W. D. Ryan,** director of illumination, General Electric Company, Schenectady, N. Y., was a recent visitor in San Francisco, where he was appointed to serve as illuminating engineer by the Down Town Association in its campaign to have a uniform style of poles and electroliers throughout the city. After his conference with the officials of the organization, he proceeded to Mexico with the association's trade tour, but will return to San Francisco to serve with that body for the remainder of the year.

**H. R. Ellis,** treasurer, Merchants Heat & Light Company, Indianapolis, Ind., was a recent visitor in San Francisco.

**P. J. Aaron,** Seattle dealer in electrical supplies, lately made a trip to San Francisco.

**C. M. Will,** electrical dealers of Portland, paid a visit to San Francisco a short while ago.

**Harry Byrne,** of the North Coast Electric Company, Seattle, lately made a trip to San Francisco.

**Murray Bourne,** of the San Joaquin Light & Power Corporation, Fresno, recently spent some time in San Francisco.

**T. J. McGrath,** superintendent. Hawaiian Electric Company, Ltd., Honolulu, Hawaii, arrived in San Francisco from the Islands a short while ago.

**D. C. Lappin,** of the Lappin Electric Company, Milwaukee, Wis., recently paid a visit to San Francisco.

**H. L. Jackman,** of the Western States Gas & Electric Company, Stockton, Calif., recently spent some time in San Francisco.

**Harry Daley,** sales manager of the Majestic Electric Appliance Company, San Francisco, has gone East on business connected with his firm.

**F. E. Browne,** representing the Peerless Insulated Wire & Cable Company, 90 West Street, New York City, has been touring the Pacific Coast in the interest of his company.

**M. T. Wright,** manager publicity department and director of broadcasting of the General Electric Company, Schenectady, was a recent visitor in Los Angeles, following his return from Honolulu.

**J. H. Jamison,** manager merchandising division, Los Angeles office of the Westinghouse Electric & Manufacturing Company, recently left on a month's trip to visit the appliance factory at Mansfield, Ohio, the main factory at East Pittsburgh and the New York office of that company. Mr. Jamison has gone East to secure the latest information on the manufacture and merchandising of electrical appliances.

**W. A. Grove,** for the past three years advertising representative of the Curtis Publishing Company, Philadelphia, has been appointed manager of advertising and sales promotion for the Edison Electric Appliance Company of Chicago.

**C. D. Weiss,** superintendent of shops, stores and transportation for the San Diego Consolidated Gas & Electric Company, was a recent visitor to Fresno where he attended the purchasing and stores meeting held there.

**G. P. Baldwin,** general manager merchandising department of the General Electric Company, with headquarters in Bridgeport, Conn., spent several days in Los Angeles recently in an inspection tour of the local territory.

**James W. Lincoln,** Lincoln Electric Company, Cleveland, paid a visit to San Francisco a short while ago.

**P. D. McKee,** vice-president and general manager of the California Oregon Power Company, Medford, Ore., and president of the Western Taxpayers' Association, accompanied by **W. H. Crawford,** manager of the new industries department of the same company, was a visitor in Salt Lake City recently attending a meeting of the Utah Taxpayers' Association.

**J. W. Anderson,** formerly sales manager of the Great Western Power Company in Sacramento, recently has resigned to become affiliated with the firm of Alexander & Lavenson Electrical Supply Company of San Francisco, with headquarters in Sacramento. Mr. Andderson will cover the Sacramento Valley.

**A. C. Riggs,** formerly line construction superintendent in the distribution department of the central district, Puget Sound Power & Light Company, Seattle, has been promoted to the position of superintendent of light and power of the northern district of that company, Bellingham, Wash., taking the place of **C. F. Terrell,** who was transferred to the El Paso Electric Company, El Paso, a Stone & Webster property.

**C. C. Thomas** has been appointed vice-president and **E. C. Macy,** general manager, respectively, of Dwight P. Robinson & Company, Inc., with offices in the Union Oil Building, Los Angeles.

**T. P. Walker,** formerly manager of the Baton Rouge Electric Company, has been made manager of the El Paso Electric Railway Company, succeeding A. H. Warren. Both companies are Stone & Webster properties. After graduating from the University of Nevada, Mr. Walker entered the employ of Stone & Webster at Reno and from there was transferred to the Boston office. After two years' active service in the army during the World War, he went to Haverhill, Mass., to become superintendent of the Haverhill Gas Light Company and later was made manager. In April, 1923, he took up the duties of manager of the Baton Rouge Electric Company which is a combined gas and electric utility. During his residence in the Louisiana city Mr. Walker took an active part in community affairs, having been, among other things, a member of the board of directors of the Chamber of Commerce. He was also a prominent member of the Rotary Club and the American Legion.

T. P. WALKER

**P. M. Parry,** commercial manager, and **E. L. Bourne,** manager of the advertising department, respectively, of the Utah Power & Light Company, Salt Lake City, were among the principal speakers at the annual banquet of the Boxelder Commercial Club held recently at Brigham City.

**J. M. Curtin,** manager industrial department Westinghouse Electric & Manufacturing Company, East Pittsburgh, recently spent a week in Los Angeles, going over the territory with the local district manager, **K. E. Van Kuanr** and the manager of the industrial division, **J. H. Fenton.**

**Edward D. Lyman** recently has become associated with the Westinghouse Electric & Manufacturing Company. He will serve as assistant to **Carl L. Burgess,** manager of the publicity division in the Los Angeles office.

**W. C. Smith,** of the San Francisco office of the General Electric Company, recently addressed Redwood Chapter of the American Association of Engineers at Eureka, Calif., following their monthly dinner at which thirty-five were present. His subject was, "Transformers."

**Alba H. Warren,** since 1918 manager of the El Paso Electric Railway Company, a Stone & Webster holding, has been made district manager of all properties in Georgia and Florida managed by Stone & Webster. Mr. Warren entered the employ of that organization in 1900, and since then has held a number of different positions with companies under its management, among them being assistant treasurer and later superintendent, Houghton County

ALBA H. WARREN

Traction Company, Houghton, Mich.; and manager Brockton & Plymouth Street Railway Company, Brockton, Mass., Pensacola Electric Company, Pensacola, Fla., and Galveston Electric Company, Galveston, Texas, respectively. The last named position he held prior to taking up his duties at El Paso. During his residence in that city Mr. Warren has taken an active part in civic affairs, and at the time of his departure was president of the El Paso Chamber of Commerce and the head of the Associated Charities. He left about Feb. 15 to enter upon his new work.

**Guy W. Talbot,** president of the Pacific Power & Light Company, Portland, and **John S. Laing,** general attorney of the same company, were in San Francisco recently in connection with the purchase of the Northwestern Electric Company.

**Karl von Hacht,** until recently connected with the sales force of the Thomas Day Company, San Francisco, has been made resident manager of the company's Sacramento branch.

**L. R. White,** formerly new business superintendent for the Pacific Gas and Electric Company at Chico, is now a partner with **William Conery** in the Gas & Electric Service Company, 233 Broadway, that city.

**Clarence Keeler** recently has been appointed production manager of the new sign manufacturing shop established by the Public Service Company of Colorado at Denver.

**L. B. Buckley** was elected chairman of the Engineering Foundation, at the tenth annual meeting of the Foundation Board, succeeding **C. F. Rand. E. D. Adams** was elected first vice-chairman; **E. A. Sperry,** second vice-chairman; **J. S. Langthorn,** treasurer; **Henry Lardner,** assistant treasurer; **A. D. Flinn,** director and secretary.

**Mrs. W. B. Kohlwey,** formerly of the Kohlwey-Smith Electric Company, San Francisco, is now office manager for the Wilson Electric Company of that city.

**J. C. Hamilton,** chief clerk at Pendleton, Ore., for the Pacific Power & Light Company, has been promoted to district manager at Sunnyside, Wash., taking the place of **Fred Florine,** who is retiring on account of ill health. **Clement Shafer,** chief clerk of the gas department at Lewiston, Ida., succeeds Mr. Hamilton.

**A. E. Holloway,** superintendent commercial department, San Diego Consolidated Gas & Electric Company and president of the Chamber of Commerce, **W. F. Raber,** general manager of the power company, and **Carl Heilbron,** president of the Southern Electrical Company, were members of the delegation of San Diegans who made a recent excursion to Yuma, Ariz., to celebrate the opening of the new coast-to-coast highway.

**H. H. Watson,** superintendent of construction for the Byllesby Engineering & Manufacturing Corporation in San Diego, recently returned from a business trip to Chicago. He stopped over en route at Minneapolis where he visited **H. H. Jones,** vice-president in charge of operations for the Northern States Power Company.

**George F. Phythian,** construction superintendent for the Byllesby Engineering & Management Corporation, is now in Salinas, Calif., to take charge of the major construction program of the Coast Valleys Gas & Electric Company for 1925. He recently completed the installation of a steam electric generating plant for the Mountain States Power Company at Marsfield, Ore., another Byllesby property.

**R. C. Stackhouse,** manager switchboard department Los Angeles division of the Westinghouse Electric & Manufacturing Company, was a recent visitor at the Pittsburgh office of the company, as well as other Eastern Westinghouse plants.

**Albert I. Appleton,** Appleton Electric Company, Chicago, recently spent some time in San Francisco.

**H. W. Brundige,** president of the Railroad Commission of the State of California in 1921 and 1922, again has been appointed to that important post. His career as a newspaperman also has made him well known, particularly in the southern part of the state. For over twenty-five years he has been identified with the newspapers of Los Angeles, having arrived in that city in 1897 to assume the position of city editor of the Los Angeles Record. After a short sojourn in Portland as city editor of the Portland Telegram, he returned to Los Angeles to become managing editor of the Evening Express. He was editor-in-chief of that paper and of the Morning Tribune and assistant publisher until his appointment to

H. W. BRUNDIGE

the Railroad Commission Jan. 1, 1919. In his capacity as private citizen he always has taken an active part in municipal affairs and has been instrumental in assisting the city of Los Angeles to accomplish many of its most important civic projects. In his official position as president of the Railroad Commission he has done much to bring about amicable settlements of controversies involved municipalities, public utilities, irrigation and other utility districts. Mr. Brundige was born in Kingston, Ohio, in 1865, and completed his education at Park College, Parkville, Mo., and the Ohio State Normal School, Ada, Ohio.

**J. T. Keleher,** formerly of the Mine & Smelter Supply Company of Denver, is now associated with the B. & R. Electrical Supply Company of that city.

**A. E. Wishon,** vice-president and general manager of the San Joaquin Light & Power Corporation, Fresno, was a recent visitor in San Francisco.

## Obituary

**Thomas F. Burke,** electrician in various San Francisco theaters for a number of years, died suddenly in that city Feb. 28.

**Dr. Saitaro Ohi,** one of Japan's pioneer electrical engineers and at one time president of the Institute of Electrical Engineers of Japan, died at his home recently.

# TRADE NOTES

**The Trumbull Electric Manufacturing Company,** Plainville, Conn., recently has issued its 1925 Catalog No. 13, which is complete and supersedes Catalog No. 12, Safety Switch Bulletin No. 5 and all supplements thereto, and Panel Board Bulletins Nos. 1, 2 and 3. The book contains 195 pages, is well printed on heavy glazed paper, generously illustrated with halftones and line cuts, and it brings under one cover up-to-date listings on all Trumbull lines. It is divided into four sections: Section I, safety switches; II, open knife switches and accessories; III, porcelain wiring devices; IV, panel boards and cabinets. The last pages are devoted to telegraphic code and indexes. A colored insert is placed at the beginning of each section for convenience in locating them. The catalog is now ready for local distribution upon request.

**The Hart & Hegeman Manufacturing Company,** Hartford, Conn., is announcing its new H & H square handle tumbler switch. This line is made in single pole, double pole, three and four-way switches in both shallow composition and porcelain bases. The same line is made with radio luminous jewel in the operating lever and also in the lock type.

**The Uehling Instrument Company,** Paterson, N. J., has issued recently Bulletin No. 118 on its Apex $CO_2$ recorder and Bulletin 118-A on the Apex pneumatic $CO_2$ meter.

**The National Lamp Works of the General Electric Company,** Nela Park, Cleveland, has announced the establishment of three new sales divisions, namely, southern lamp division, southwestern lamp division and northern lamp division, with general offices at Atlanta, Ga., Kansas City, Mo., and Minneapolis, Minn., respectively. The Banner electric division, Youngstown, Ohio, and Colonial electric division at Pittsburgh, Pa., have been consolidated with general offices at Pittsburgh and will be known as the Allegheny lamp division.

**Dahl Electric Company,** San Francisco, has opened a branch in the Crystal Palace Market, that city.

**The National Radio Company,** Seattle, has opened a new retail radio store at 112 Stewart Street, its personnel consisting of George W. Cleveland, Jr., C. R. Closser and H. C. Perkins, the latter to be general manager of the company.

**Western Electric Company,** San Francisco, announces that it is actively taking up the sale of the complete line of Majestic air heaters, including their heavy duty lines, and is prepared with stocks to serve the trade.

**The Lionel Corporation,** New York, is celebrating its silver jubilee, the first models of miniature electric trains and railroad accessories first having been introduced in 1900. In commemoration of the anniversary many new models have been added to the line.

**Packard Electric Company,** Warren, Ohio, has issued Bulletin 200-A, which covers a complete line of distribution transformers.

**The Williamson Electric Company,** 1414 Fourth Avenue, Seattle, has been purchased by J. P. Drew and B. P. Warren, following the retirement of H. E. Williamson from the firm. Both new owners are well known in local radio and broadcasting circles.

**The Edeson Electric Company,** Seattle, has purchased the **Coliseum Cut-Price Radio Shop,** 504 Pike Street. The Edeson company has been a pioneer in radio work at its store at 1120 First Avenue, which will be continued. The firm has established New York representation, through which direct contact is maintained with the newest radio developments and the best values.

**The Robbins & Myers Company,** Springfield, Ohio, has issued recently catalog No. 1243, which completely illustrates and describes its 1925 line of fans. It has also ready for distribution its dealer portfolio, which gives a complete layout of the dealer helps which the company is prepared to furnish for the 1925 season.

**The Commercial Manufacturing & Supply Company** of Denver is installing galvanizing equipment in order to accommodate new business necessitated by recent changes in the electrical ordinance in that city. Cabinets, switch boxes, panel boards and similar equipment are now being produced by the company.

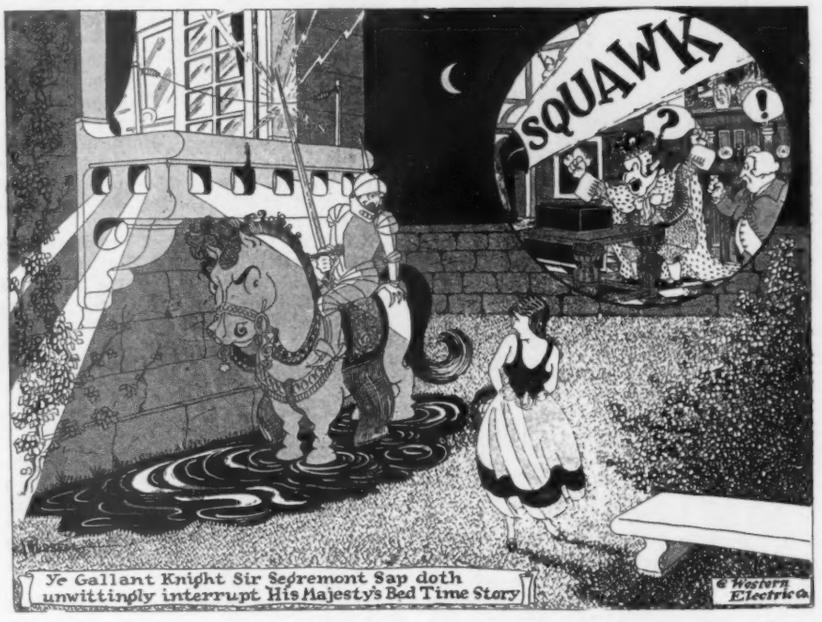
**The Roller-Smith Company** of 233 Broadway, New York, announces the appointment of W. H. Pugh as its representative in the northeastern part of Pennsylvania with headquarters at its factory at Bethlehem, Pa. Mr. Pugh formerly represented the company in the territory immediately adjoining Bethlehem.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh,** has recently designed a new single-oven range of small and compact size, known as Junior Automatic Electric Range. The new design embodies all the features of other types of ranges, having a clock which automatically turns on the current, while a thermostat turns it off at any desired temperature. The oven is thoroughly insulated and is made of sheet steel and finished both inside and out with a heavy coat of blue vitreous enamel. It is heated with two 1,500-watt units of the open brick type and the three surface units, consisting of one 8-in. 1,500 watt, one 8-in. 1,000 watt, and one 6-in. 1,000 watt, are also of the open brick type. The ranges may be obtained in both black japanned and white vitreous enamel finish.

**The Cutler-Hammer Manufacturing Company,** Milwaukee, has recently completed a new device, known as the "Cutler-Hammer Radioloc Switch," a locking switch, which makes its possible to lock the radio set "off" when you leave it, protecting batteries from being run down and tubes burnt out. The switch, installed in the "A" battery circuit, also provides a convenient means of interrupting reception without loss of station, the set being "on" when the key is in the slot and always "off" when the key is removed. The device is easily installed, requiring only one hole in the panel.

**General Electric Company,** Schnectady, N. Y., has issued recently Bulletin No. 45,609, describing the general construction, principles of operation and exclusive features of its surface air cooler. The bulletin is a 10-page leaflet, well illustrated by photographs and drawings.

**The Griscom-Russell Company,** New York, has recently issued Bulletin No. 242 on the Russell U-Tube storage heater, for heating water in dyehouses, laundries, hotels, apartments and other places where the exhaust steam supply is limited. It can be obtained by addressing the company at 90 West Street, New York.




"Electrified History" depicting the reason for "King Arthur's Short" as interpreted by the Western Electric Company.